

# Energising Development Programming Report 2021 Update

2021

### **Partnership between**

**The German Federal Ministry for Economic Cooperation and Development**

**The Netherlands Ministry of Foreign Affairs**

**The Norwegian Agency for Development Cooperation**

**The Swiss Agency for Development and Cooperation**

With co-financing from the **Australian Department of Foreign Affairs and Trade, the European Union, Icelandic International Development Agency, IKEA Foundation, Irish Aid, Korea Foundation for International Healthcare, Swedish International Development Cooperation Agency, the UK Foreign, Commonwealth and Development Office, and the United States Agency for International Development**

### **Coordinated and implemented by**

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Rijksdienst voor Ondernemend Nederland (RVO)

Association pour le Développement de l'Energie Solaire Suisse (ADES)

Association of Volunteers in International Service (AVSI)

Collaborative Labeling and Appliance Standard Program (CLASP)

Humanistisch Instituut voor Ontwikkelingssamenwerking (HIVOS)

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# EnDev at a glance

Around 4 billion people have no access to electricity or modern cooking technologies. This has a dramatic impact on quality of life, environment, health, education and income opportunities. EnDev's involvement focuses on providing access to modern, renewable energy. This is a pivotal factor in strengthening socio-economic development and combatting climate change.

EnDev's drive is to improve the lives of the most vulnerable people, ensuring no one is left behind. Economic opportunities and green jobs are created by building markets for modern, renewable energy. EnDev contributes to reducing greenhouse gas emissions to protect our planet's climate. Its approach is to empower structural, self-sustaining change; kickstarting market and sector development that evolves further without support by EnDev.

EnDev's work is about people. Results are monitored and reported rigorously. EnDev's achievements on helping people, schools, health centres, and companies gain access to electricity or improved cooking technologies can be found in this report. This report also presents EnDev's impacts on gender, job creation, and reduced carbon emissions.

EnDev is a strategic partnership. Dedicated donors, partners and individuals work together to support social development and economic growth by providing access to modern, renewable energy in more than 20 countries around the globe. The driving force behind EnDev is the partnership of Germany, the Netherlands, Norway, and Switzerland; donors who are committed to accelerating energy access and socio-economic development.



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# 1. Executive summary

2021 was kicked-off with another portfolio-wide programming cycle based on the results of the second comprehensive portfolio review which was conducted in 2020. EnDev country projects were requested to initiate the programming for their new indicative project durations until 2023 or 2024 respectively, factoring in COVID-19-induced implications on market development. This report summarizes trends at global level regarding strategic priorities while EnDev country proposals are compiled in Annex A. Annex B presents the Independent Technical Advisory Committee's feedback as part of the independent assessment of the programming.



## Key trends

Indicative planning anticipates that by 2024 EnDev will have facilitated sustainable access to modern energy services and technologies for about 28.49 million people. 73% of the target achievement on household level comes from access to thermal energy (mainly cooking), while households with access to electrical energy contribute 27% to the overall target achievement. While the focus remains on thermal energy, strategic steering towards electrical energy continues. A moderate positive programmatic trend is also foreseen with regard to energy access for social infrastructure (SI). It is anticipated that an additional of 6,200 SIs will be reached until the end of 2024. Particular emphasis is being placed on productive use of energy. Thus, a significant trend is anticipated regarding energy access for micro, small and medium-sized enterprises (MSMEs) with a planned additional result of 32,600 MSMEs reached until 2024. The programming anticipates that most economic activities to be supported are expected in the area of food and beverage services and agriculture and fishing. At the same time, new trends are emerging such as growth in support for manufacturing, trade, transport, and information

technology. Annual savings of CO<sub>2</sub> emissions are expected to show a continued growth so that in 2024 EnDev will contribute to annually save 2.67 million tonnes of CO<sub>2</sub> emissions.

## Financial situation

With this programming, EnDev proposes to allocate a total of EUR 431.835 million for continued global management as well as operations in 21 countries from 2009 until June 2022. This requires additional funds of EUR 10.092 million on top of currently secured available funds of EUR 421.743 million. Advanced negotiations with different partners suggest that EnDev will be able to secure the additionally needed funds shortly. EnDev's total indicative budget until 2025 sums up to EUR 470.132 million. Therefore, substantial additional funds will be required to continue implementation beyond this programming's duration until June 2022.

## Portfolio development

EnDev continues to broadly deliver on SDG 7 and share its lessons learnt, also in light of the upcoming *High-level Dialogue on Energy* in September 2021. With regard to electrical energy, EnDev continues to support increasingly higher tier access, while following a consumer-centric



approach. Trends being observed in the area of rural electrification such as energy access and digitalization and interconnectivity of different technologies are also reflected in the programming. With regard to cooking, programmatic trends show a continued support to companies producing and distributing biomass-based transitional clean cooking solutions. However, more and more countries are exploring higher tier cooking including the potential of electric cooking, even though their contribution to global target achievement of EnDev remains minimal in absolute terms. For productive use of energy, EnDev will continue to work on priority aspects of its new strategy such as building local businesses, creating markets for technologies increasing the scope of productive use of energy, but also supporting micro, small and medium-sized enterprises in accessing finance. As part of the programming, a portfolio-wide comprehensive safeguards and gender approach was applied. To further underline EnDev's increased ambition level for gender equality, a strategic partnership with ENERGIA has been established. In future, EnDev country projects will be provided with direct support in terms of a gender helpdesk.

### **Expected challenges**

In 2020, progress towards SDG 7 was lower than foreseen and related SDGs were at risk due to the effects of the COVID-19 pandemic. The pandemic is expected to continue to have a strong influence on market development and long-term implications are likely to become visible in the upcoming months. Accordingly, it is expected that COVID-19 will also continue to negatively affect EnDev's future target achievement. Developments will be closely monitored to allow for necessary adjustments. With EnDev's immediate response measures and interventions carried out in 2020, the programme not only provided short-term relief but helped to pave

the way to build back better which has proven to provide much needed support for the energy sector. With regard to the uncertain outcome of the pandemic, EnDev will further work towards fine-tuning its instruments and will also embark on a global learning agenda to ensure that best practices and innovative solutions are shared.

### **Partnerships and innovations**

EnDev will continue the collaboration with important key players in the energy access sector. With the *World Bank*, EnDev is in a continued exchange on clean cooking and rural electrification and, most recently, also with regard to policy approaches. In addition, EnDev has been cooperating with the *Clean Cooking Alliance (CCA)* with respect to a global strategy for the cooking sector including support to private sector companies. On the level of private sector collaboration, the existing channels to and the cooperation with *Global Off-Grid Lighting Association (GOGLA)* will be strengthened. The focus foreseen for this collaboration is on topics such as e-waste recycling, dedicated risk mitigation mechanisms, and tackling the implications of COVID-19. In 2021, EnDev will continue its work along the thematic tracks of its renewed learning and innovation agenda. To promote innovation, RVO has established an innovation fund which is targeting EnDev's implementing partners.

### **Proposed changes**

In this *Programming Report 2021 Update*, proposed changes are as follows:

- For all EnDev country projects, a re-programming is proposed to further align with EnDev's strategy and to factor in COVID-19-induced implications on market development.
- For all EnDev country projects, project durations are proposed to be extended until June 2022 and budgets to be adjusted accordingly.

## From washing carrots to growing communities

How a carrot-washing machine has led to benefits for more than 100 families in Bolivia

On the plateau of the Bolivian capital La Paz, the farmer Julio Helguero used to spend hours in rivers, washing carrots by stepping on them. Using this method, two people could wash between 1.5 to 2.5 tonnes of carrots per day. So Julio designed a machine that would make washing carrots easier and bring prosperity to the small farming community of Mantecani, and others. But it wasn't as easy as he had imagined: At first, the huge carrot-washing machine was powered via a household connection to the national grid. This meant that the machine overheated easily, damaging its engines. Through the municipality, Julio made contact with EnDev Bolivia. EnDev provided technical support to ensure that technical specifications were correct and the machine could be used safely. Additionally, EnDev carried around two thirds of the investment costs for a much needed voltage transformer. Having installed the transformer and electricity meter, the machine now washes an average of 40 tonnes per day. Julio explains: "Instead of four hours, the carrot wash now takes just 30 minutes for a single load. People can use the time to grow and harvest other vegetables – and still take their washed carrots to the market." Since 2012, small and medium-sized enterprises have replicated this idea country-wide thus contributing to the productive use of energy. Between 2009 and 2019, EnDev Bolivia supported the introduction of 2,200 productive use technologies such as water pumps, milking machines and cooling tanks, or grain mills.'





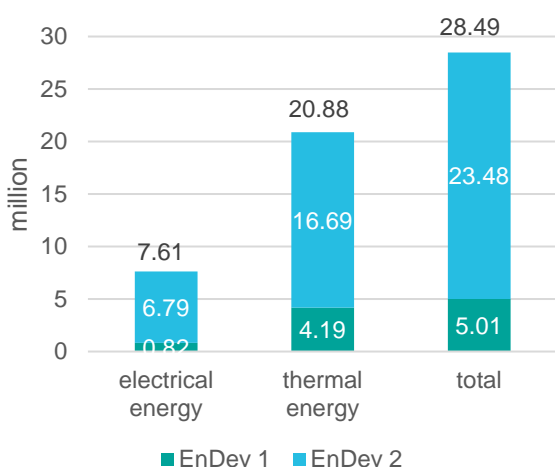
## 2. Portfolio development

By 2024, EnDev will have facilitated sustainable access to modern energy services and technologies for about 28.5 million people, 34,700 social infrastructures, and 106,100 micro, small and medium-sized enterprises. The programming anticipates that about 4.8 million people, 6,200 social infrastructures and 32,600 micro, small and medium-sized enterprises will be reached additionally within the next four years. EnDev interventions will save 2.67 million tonnes of CO<sub>2</sub> emissions in 2024.

### 2.1 Dashboard

By 2024 EnDev will have facilitated sustainable access to modern energy services and technologies for about 28.49 million people. 5.01 million people were reached during EnDev 1 until 2009. The contribution of EnDev 2 to sustainable access to modern energy services and technologies will reach 20.88 million people. By 2024, access to electrical energy will be available for a total of 7.61 million people (27%) and 20.88 million people (73%) have access to improved and more modern forms of thermal energy (Figure 2-1 and Figure 2-2). Strategic steering towards electrical energy continues. While the focus remains on thermal energy, the current programming puts a stronger emphasis on electrical energy and shows a slight shift of the portfolio towards electrical energy.

Figure 2-1  
Projected number of people reached – EnDev 1+2



Regionally, the focus of EnDev 2 will remain in sub-Saharan Africa with 68% of committed EnDev 2 funds (Figure 2-3). The share of least developed countries (LDC) supported by EnDev 2 will be 64% (Figure 2-4).

Figure 2-2  
Projected number of people reached by technology – EnDev 1+2

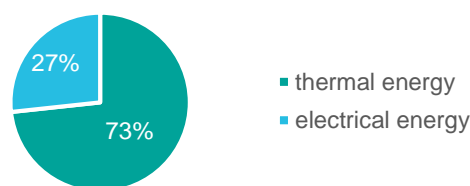


Figure 2-3  
Indicative funding by region – EnDev 2

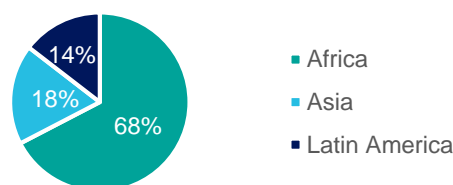


Figure 2-4  
Indicative funding by country classification – EnDev 2

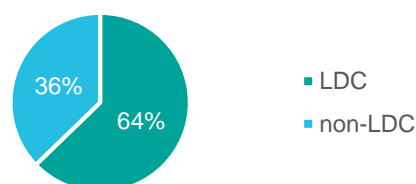


Table 2-1  
**Indicative countries<sup>1</sup> and technologies from 2021 to 2024**

	Stoves	Biogas	Other cooking	SHS	picoPV	Solar	Hydro	Grid	Other lighting
Bangladesh	●				●				
Benin	●			●	●			●	●
Bolivia	●				●			●	
Burundi	●								
Cambodia (with Laos)	●								
Democratic Republic of the Congo (DRC)	●			●		●			
Ethiopia	●			●	●	●	●		
Kenya	●			●	●	●			
Liberia (with Sierra Leone and Guinea)	●		●		●	●			
Madagascar	●								
Malawi	●			●	●				
Mali	●			●	●	●			●
Mozambique	●				●		●	●	
Nepal	●						●	●	
Rwanda	●	●			●	●	●		
Senegal <sup>2</sup>	●		●	●		●		●	
Tanzania	●				●				
Uganda	●			●	●		●	●	

<sup>1</sup> Components that phased out or will phase out in 2021 are shown in lighter colour.

<sup>2</sup> Cookstove component of Senegal will be fully transferred to the project *Promotion of climate-friendly Cooking: Kenya and Senegal* commissioned by BMZ with co-financing from GCF.

## 2.2 Energising Lives: Social development

### Projections for energy access for households



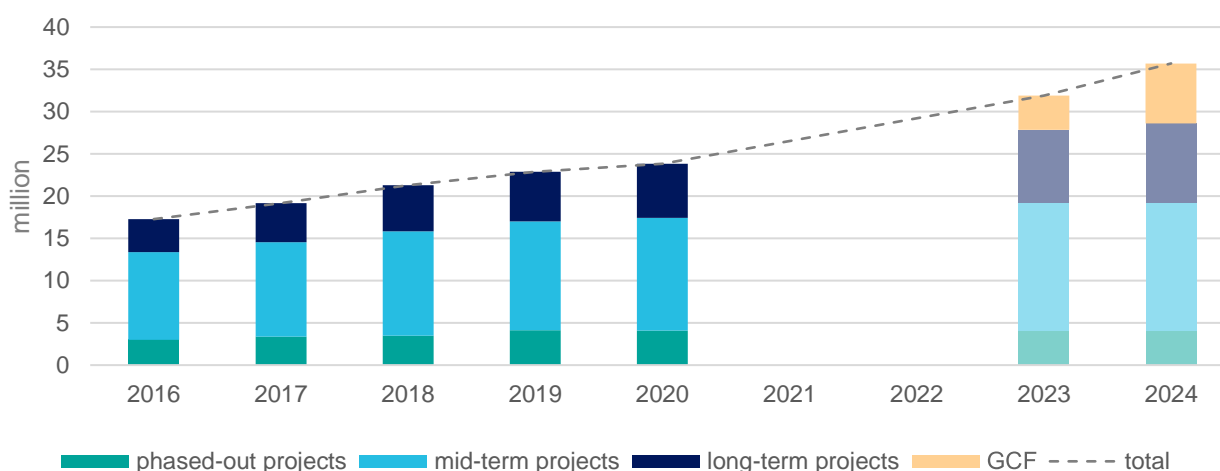
The programming shows a solid growth regarding access to energy for

households with a planned additional result of 4.78 million people reached by the end of 2024. The project *Promotion of climate-friendly Cooking: Kenya and Senegal* is expected to contribute an additional result of 7.10 million people until end of 2024 to EnDev. Including the results of EnDev 1, the overall achievement of EnDev is planned to reach 35.69 million people by end of 2024 with and 28.59 million people without funding of the Green Climate Fund (GCF) (Figure 2-5).

Another 4.13 million people are additionally targeted beyond 2024 with GCF funding where the overall GCF result is planned to reach 11.23 million people.

It needs to be noted that such long-term projections which span a duration of four years from the date of submission of this report need to be handled cautiously and that market dynamics as well as changing implementation conditions might have massive (negative) influence on results achievement. The unprecedented implications of COVID-19 demonstrate a drastic example of such negative dynamics.

Figure 2-5  
Results and projected number of people reached – EnDev 1+2



EnDev’s long-term country projects will contribute 62% to the additional 4.78 million people that will get access to energy, while mid-term country projects will contribute the remaining 38% (Figure 2-5). It can be further noted that with 1.44 million people, 30% of the additional results will be reached by electricity. This indicates the positive trend of the strategic shift towards more electricity access in the portfolio. By the end of 2020, the share of households

with access to electricity was at 26%. From now until 2024, the share of electricity access will be 4% above this long-term average. Most of the results will be reached in sub-Saharan Africa while the contribution in Asia will be slightly higher than in Latin America.

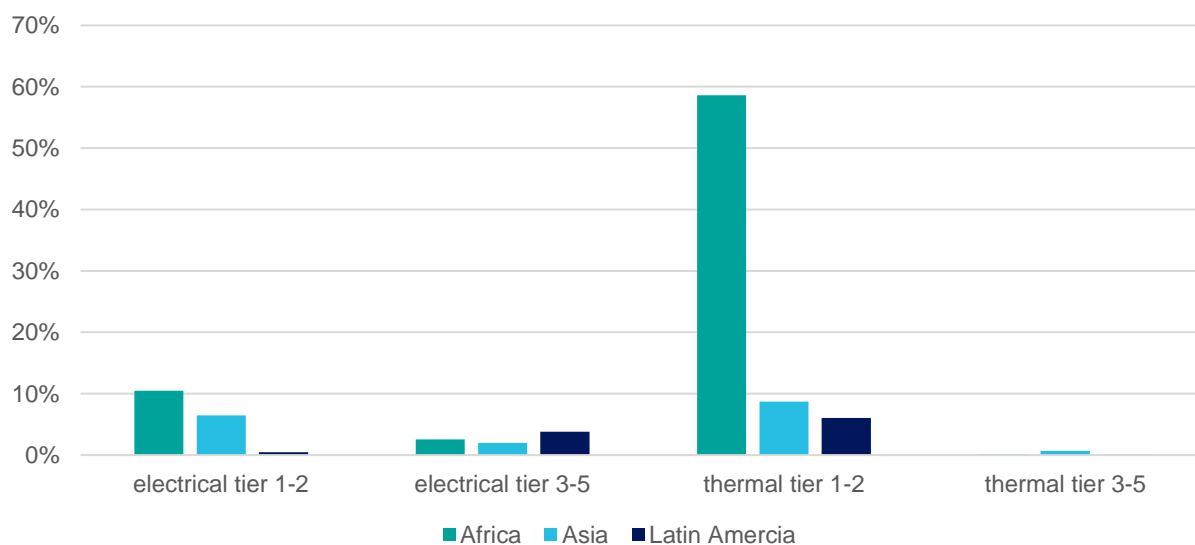
Figure 2-6 provides a detailed overview about the projected distribution of results by region and tier segment. The

outstanding role of cooking technologies in thermal tier 1-2 in Africa with 59% becomes obvious. Electrical tier 1-2 in Africa contributes 11% and thermal tier 1-2 in Asia adds 9%.

The expected average growth until 2024 will be about 1.2 million people per year which is lower than the average of the last four years with 1.6 million people per year. There are several factors behind this less dynamic growth path. With an average annual total budget of EUR 21.0 million funds for in-country implementation are significantly lower in the next four years than before; between 2017 and 2020, expenditures averaged EUR about 36.0 million per year. Against this backdrop, the indicative

future cost efficiency becomes evident. Effects of the strategic re-alignment also play a role. On the one hand, country projects are stepping up their activities in the area of household electrification, which from experience requires more funding than access to thermal energy. On the other hand, projects are also moving into more strategic and impactful but also more cost-intensive intervention areas such as a stronger push for the productive use of energy or sector development. Last but not least, negative economic implications of COVID-19 on energy access market development result in less dynamic progress in target achievement of EnDev (see Chapter 5.2).

Figure 2-6  
**Projected distribution of household access by region and tier – EnDev 1+2**



**Programmatic trends in thermal energy access**

The programming shows continued support for transitional clean cooking solutions that are within reach of large shares of the population in EnDev’s partner countries. To this end, further support to companies developing and distributing improved biomass stoves is foreseen for the years to come. In order to strengthen MSMEs and to contribute to a paradigm shift, more

emphasis is put on business development support for local emerging professional stove businesses. This will enable companies to grow and expand their business capacity and deliver improved high quality products or services sensitive to the local context.



In order to accelerate the uptake of modern cooking solutions on the demand side, EnDev will continue to engage in awareness raising and behaviour change campaigns but will also explore different financing mechanisms for costumers. To address the barrier of affordability, country projects e.g. Burundi, DRC, and Ethiopia are partnering with banks, micro-financing institutions and village savings and loan associations to offer innovative and affordable financing products.

To support the enabling environment and stimulate growth, the clean cooking sector is in need for a convening, coordinating and binding force, a strong and aligned voice, and a common base for knowledge and expertise. Support to national clean cooking alliances, is continued to be mainstreamed in Bangladesh, Ethiopia, Kenya, and Uganda. Standards and related policies for enforcement of standards shift markets to higher quality products and stimulate innovation. EnDev will support and advise national governments, test centres and other sector players in various countries in defining and rolling out quality standards and labelling schemes for improved cookstoves (ICS).

Following a transitional path, more and more countries are also exploring higher tier cooking including the potential of electric cooking. E-cooking interventions range from feasibility studies to pilots for kicking off market development for e-cooking appliances. Pilots are currently under preparation in:

- Bangladesh
- Cambodia
- DRC
- Kenya (continued)
- Mozambique
- Nepal (continued)
- Rwanda
- Tanzania

While the following countries are assessing the potential of electric cooking and considering pilots at a later stage of the project phase:

- Benin
- Ethiopia
- Uganda

Regarding grid-connected e-cooking, particular emphasis is also being placed on the enabling environment and working with national and local energy authorities as grid capacity and reliability of electricity supply is still limited for high consumption electric appliances. In order to strengthen the supply and distribution of efficient appliances EnDev will also support testing and labeling of appliances at national level e.g. in Bangladesh, whereas at global level testing and labeling is subject to the *Collaborative Labelling and Appliance Standard Program (CLASP)* and the *global Lighting and Energy Partnership (LEAP) award*.

### **Programmatic trends in electricity access**

To achieve higher social and economic development impacts, EnDev will continue to build, strengthen, and support markets for decentralized renewable electrification in vulnerable and underserved communities, as well as in off-grid peri-urban settings with higher tier access. Also, grid densification/extension is further supported in certain contexts. The programming shows that further development of technologies in terms of product improvement and innovation is continuing, and there are signs that the use of technologies is becoming more interlinked, more digital and more integral.

In addition to continued interventions regarding picoPV, solar home systems (SHS), mini-grid and grid, EnDev supports the interconnection between different technologies, such as mini-grid integration to the grid in Senegal. In Mozambique, EnDev supports nano-grid project

developers and operators. Nano-grids serve only very few customers at a time from each node. Nodes may be interconnected to each other to make systems more resilient and at the same time independent – also to reliably serve small-scale productive loads.

An increasing importance of digitalization can be observed which is certainly also due to the further development of technologies and the increasing interconnectivity. While digitalization in the SHS space is already far advanced and was initially developed out of the necessity of being able to track and monitor systems, as well as payments (PAYGO and its acceleration of the

distribution of SHS), other system technologies are now following. In Ethiopia, EnDev provides support to government agencies in the digitalization of the off-grid sector as a hub for better identification of and decisions on mini-grid sites and other areas for furthering rural electrification. In Liberia and Senegal, EnDev also has a special focus on digitalization as part of their interventions regarding rural electrification. In Mali, EnDev supports companies which deploy integrated solutions to cover the entire energy demand of rural communities ranging from power supply to commercial customers or main productive uses, to social institutions, and close-by residential premises.

### Projections for energy access for social infrastructure

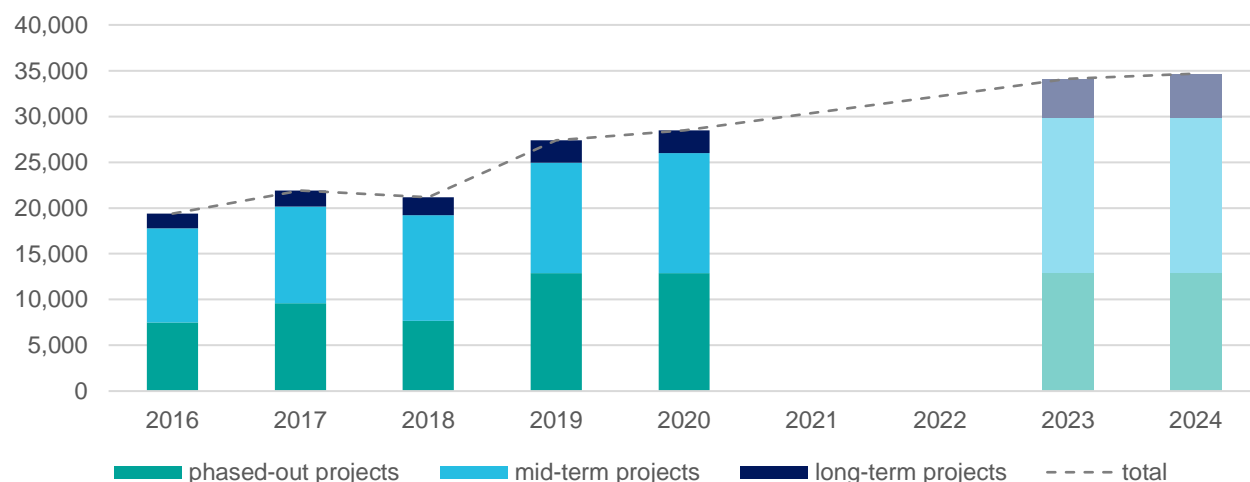


The programming shows a moderate growth regarding access to energy for social infrastructure (SI) with a planned additional result of 6,200 SI reached until the end of 2024. The overall achievement is planned to reach 34,700 SI (Figure 2-7). Country projects with a long-term perspective contribute 38% to this growth, while the medium-term country projects contribute 62% to the additional target achievement.

Until 2024 additional 2.700 SI will get access to electricity which represents 43% of the additional result, 3.500 SI will get access to thermal energy.

The distribution between electrical and thermal energy has not changed noticeably compared to 2019, settling at around 38% SIs with access to electricity and 62% of SIs with access to thermal energy.

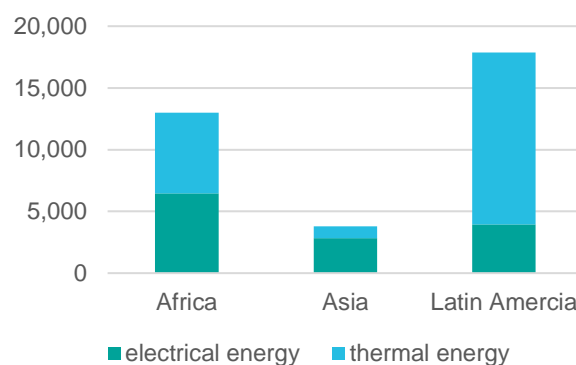
Figure 2-7  
Results and projected number of social infrastructure– EnDev 1+2



Regionally, the largest contribution to SI target achievement will still be in Latin America with 52% (in total 17,800 SI) (Figure 2-8). Africa is expected to contribute 37% (in total 13,000 SI), while the share of SI in Asia is 11% (in total 3,800 SI).

The target achievement for SI shows a positive development but only with moderate changes. The explanation for this is the strategic priority of MSMEs which is also reflected well in the programming.

Figure 2-8  
Projected results for social infrastructure:  
geographic and technology distribution –  
EnDev 1+2



## 2.3 Energising Opportunities: Economic development

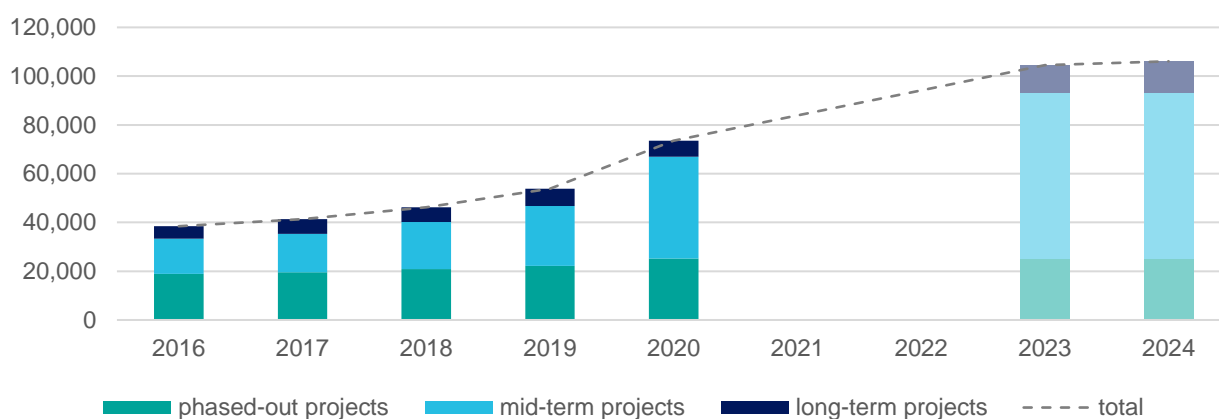
### Projections for energy access for micro, small and medium-sized enterprises



A significant upward trend is anticipated regarding energy access for micro, small and medium-sized enterprises (MSMEs) with a planned additional result of 32,600 MSMEs

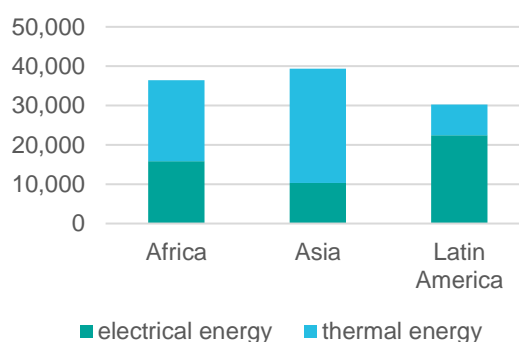
reached until the end of 2024. Top countries planning to deliver two-thirds of the additional results are Bangladesh, Bolivia and Kenya. The overall achievement of EnDev 1+2 is planned to reach 106,100 MSMEs by the end of 2024.

Figure 2-9  
Results and projected number of micro, small and medium-sized enterprises – EnDev 1+2



While in 2019, the split between electrical energy and thermal energy was 61% and 39% respectively, projections show (Figure 2-10), that electrical and thermal energy services, with 46% and 54%, are nearly equally distributed by 2024. Also, there is a strong increase in terms of share of overall MSMEs to be reached in sub-Saharan Africa. Whereas the distribution of MSMEs to be reached in 2020 across Africa, Asia and Latin America was 18%, 42% and 37% respectively, by the end of 2024 the shares are expected to be 34%, 37% and 28%.

Figure 2-10  
Projected results for MSMEs: geographic and technology distribution – EnDev 1+2





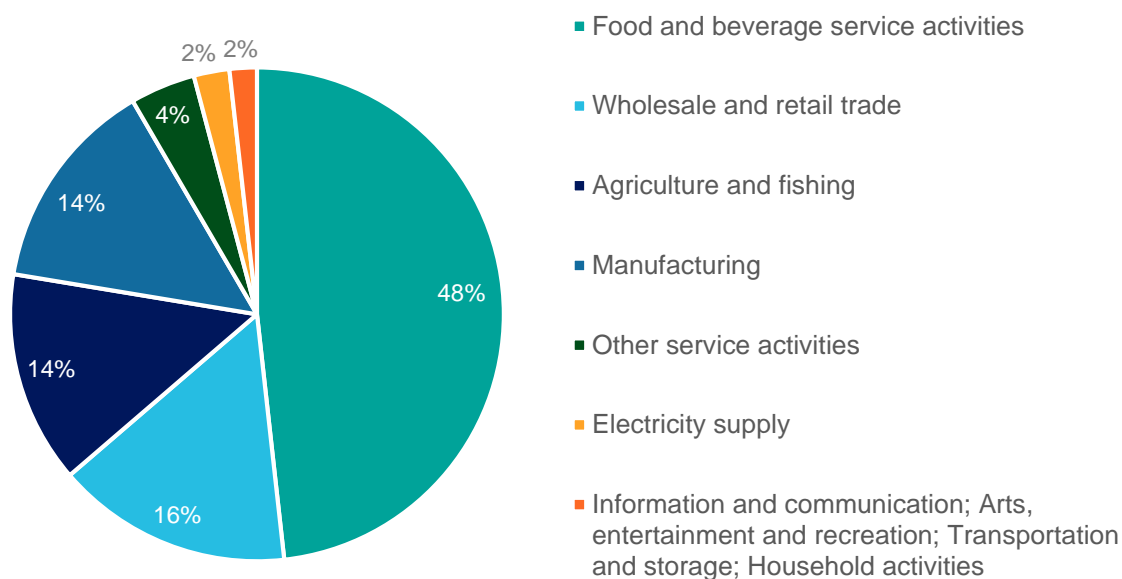
For the purpose of improved data disaggregation, the monitoring methodology of MSMEs to be reached was recently refined and a standardized categorization regarding sectors, sector-specific types of economic activity, company sizes, gender aspects and energy application was introduced. Based on this revision, the following trends can be identified.

Figure 2-11 shows, that most economic activities to be supported are expected to fall under food and beverage services or are related to agriculture and fishing. Lighting for security and evening shopping also remains important. New trends include

growth in support for manufacturing (e.g. furniture, textiles, metal products etc.), trade (i.e. wholesale and retail), transport and information technology, as well as solar water pumping and cooling, entertainment and digital services.

Whereas thermal energy, with 88% of all additional MSMEs to be reached until 2024, will be used almost exclusively in the sector of food and beverage services, 93% of all the other sectors (i.e. all except food and beverage services) are being reached with electrical energy services.

Figure 2-11  
**Projected additional MSMEs to be reached by sector<sup>3</sup>**



<sup>3</sup> Classification of sectors in line with [International Standard Industrial Classification of All Economic Activities \(ISIC\)](#)

Figure 2-12  
**Projected additional MSMEs to be reached by number of employees – 2022-24**

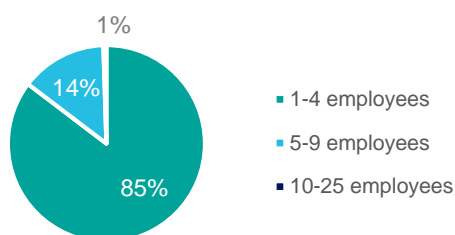


Figure 2-13  
**Projected share of employees of additional MSMEs to be reached – 2022-24**

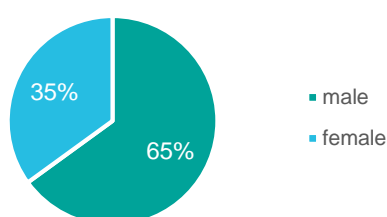
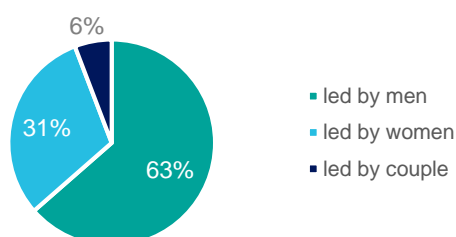


Figure 2-14  
**Projected additional MSMEs to be reached by company lead – 2022-24**



As indicated in Figure 2-12, most of the enterprises targeted by EnDev are micro and small-sized enterprises. 99% of the enterprises will most likely not employ more than ten persons (incl. company lead), of which 85% will employ one to four persons and 14% five to nine persons. As expected, the supported companies tend to be small, reflecting the rural context in which EnDev operates. Further, Figures 2-13 and 2-14 reflect EnDev’s focus on gender equality and women’s (potentially) increased income from productive use of energy, especially but not only along the food and beverage value chain, with projected results of at least 35% female employees (incl. company lead), 31% of the MSMEs being led by women and 6% being led by couples.

### Programmatic trends in productive use of energy

More striking than the economic sectors addressed, however, is a marked shift in the approaches taken to support rural businesses in using new or improved energy technology. The most frequently addressed barrier for MSMEs across the EnDev portfolio now reflects the key real-life challenges they face: a lack of financing options, and also a low-level of formal business skills.

To address these barriers, many EnDev country projects are partnering with banks, village savings and loan associations, savings and credit cooperative organizations, and development partners as well as training institutions to offer innovative and affordable financing products and to address capacity gaps for using them. Getting local banks and cooperatives to offer loans for small entrepreneurs is one option, offering mini credits with mobile money or establishing PAYGO for productive uses are other routes being explored.

Business development training for targeted entrepreneurs accompanies the interventions for improved finance and are often combined with awareness raising of the needs and possibilities for financiers, customers, and the businesses.

The IKEA Foundation has joined EnDev as a new co-financing partner, concentrating on promoting the productive use of energy in the agricultural sector in East Africa. With a strong focus on entrepreneurial aspects as well as innovative elements, this engagement provides a welcome opportunity to test new approaches and – with its integrated learning agenda – contribute to broader learning and potential replication in support of progress towards SDG 7

## 2.4 Energising Climate: Combating climate change



### Projections for annual savings of CO<sub>2</sub> emissions

Annual savings of CO<sub>2</sub> emissions are expected to show a continued growth: In 2024, 2.67 million tonnes of CO<sub>2</sub> will be saved that can be attributed to EnDev. The overall CO<sub>2</sub> savings of EnDev will accumulate to 27.2 million t by the end of 2024 ( Figure 2-15).

A breakdown of the foreseen CO<sub>2</sub> savings per region and technology is presented in Figure 2-16. 94% of the CO<sub>2</sub> emission savings will be achieved through cooking technologies. Regionally, a total of 87% of the

CO<sub>2</sub> emissions will be saved in 2024 in sub-Saharan Africa (82% via thermal energy and 6% via electrical energy). In Asia and Latin America, CO<sub>2</sub> savings via thermal energy will amount to 7% and 5% respectively. CO<sub>2</sub> savings via electrical energy in Asia and Latin America together will remain below 1% and thus will continue to be insignificant in EnDev’s portfolio.

Ongoing country projects will achieve annual emissions reduction of 2.49 million tonnes of CO<sub>2</sub> which will be 93% of the total annual CO<sub>2</sub> savings (Figure 2-16).

Figure 2-15  
Projected CO<sub>2</sub> savings - EnDev 1+2

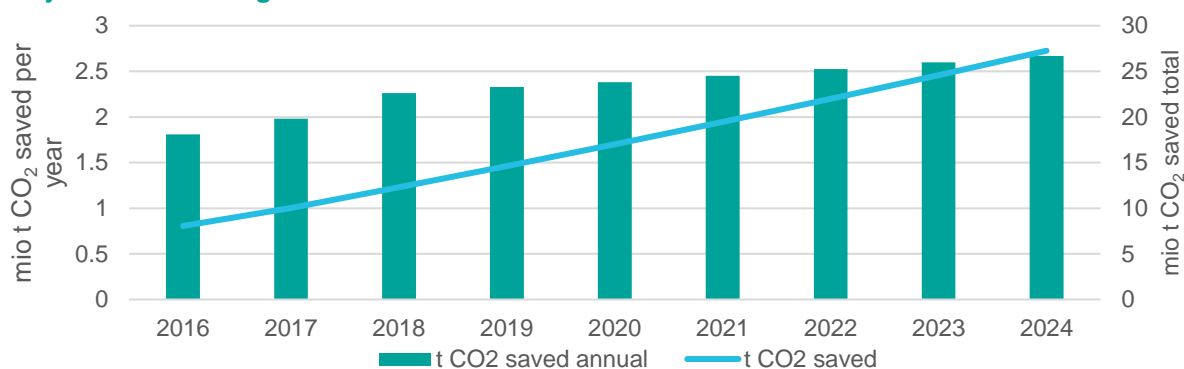
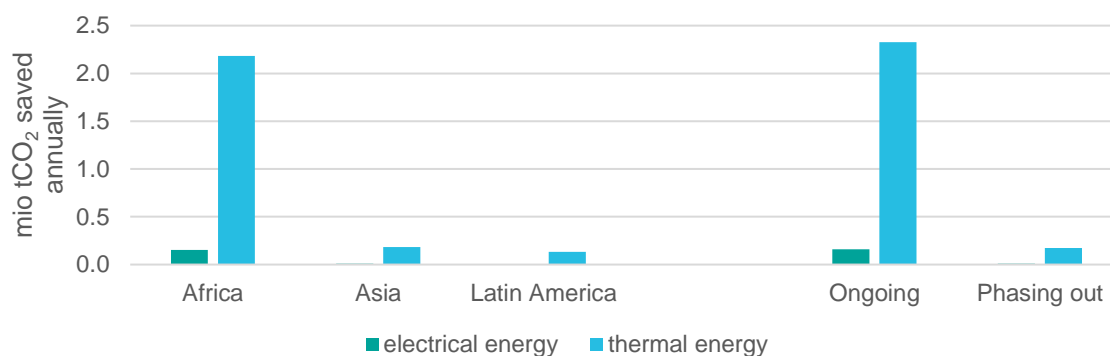


Figure 2-16  
Projected annual CO<sub>2</sub> savings by technology, region and project type



## 2.5 Expected challenges: COVID-19 induced implications

The COVID-19 pandemic has severe economic impacts worldwide and a particular impact on the economic development and the energy sectors of EnDev partner countries. After the first wave of the pandemic hit and countries worldwide went into lockdown, energy companies were severely affected by interrupted international and regional supply chains as well as by restrictions in serving their local markets. While many of those companies that managed to survive this crisis and were struggling to economically get their feet back on the ground, the second COVID-19 wave in the second half of 2020 again led to partial lockdowns in many countries. Even though the lockdowns during the second wave were limited to ensure that economic operations would continue as broadly as possible, local energy companies were increasingly under financial distress. The COVID-19 waves not only affected the supply side but also the demand side with severe impacts on the purchasing power of customers.

So far, long-term implications of the pandemic are not yet easy to predict. Since the pandemic is expected to continue to have a strong influence on market development, it

will in turn also continue to negatively affect EnDev's future target achievement.

Since the COVID-19-related impacts further intensify central challenges regarding economic and socio-economic development, it is of great importance that economic reconstruction simultaneously promotes an economic and socio-economic transformation that focuses on sustainability and climate protection. Investments in "green" infrastructure and decarbonisation of the energy sector play a crucial role in this transformation. Recovery programmes to mitigate negative impacts of the pandemic can accelerate a targeted ecological and socio-economic turnaround.

With EnDev's immediate response measures and interventions carried out in 2020, the programme helps to pave the way to build back better which have proven to provide much needed support for a crucial sector. Moving from immediate assistance to longer-term activities strengthening the sector's resilience will dominate the agenda in the years to come. EnDev will also embark on a global learning agenda to ensure that best practices and innovative solutions are shared and replicated.



### 3. Partnerships

To broadly contribute to building back better in the context of the global pandemic, EnDev will pursue a concerted effort to expand its international partnerships also in 2021 and onwards. To deliver on the Agenda 2030, and particularly SDG 7, as well as the Paris Agreement EnDev aims to strengthen its international network to further tap synergies with a variety of international players. However, EnDev needs to be selective to ensure optimal resource allocation and efficiency.



#### **Continued collaboration with global key players**

The partnership with the World Bank and particularly its *Energy Sector Management Assistance Program* (ESMAP) is a strategic cornerstone for EnDev. Whilst EnDev has the flexibility to quickly include new developments and react to emerging challenges on very short notice, the World Bank brings crucial leverage and scale. The fact that the World Bank has more actively ventured into the clean cooking and off-grid sectors is a strong argument for a continuation of this close partnership. Numerous country activities have also proven to benefit from a close cooperation, when closely aligned (see pro-poor RBF concept in Rwanda that has been taken up by World Bank or the collaboration on a PAYGO Toolkit between WB, EnDev and GET.Invest).

The CCA and the *Health and Energy Platform of Action* (HEPA) are important partners to raise awareness and attract political attention for areas that are of vital interest for EnDev. A continued cooperation on technical and policy trajectories will ensure that EnDev's important local presence and experience can also feed into international advocacy and agenda setting processes which are driven by other partners. EnDev's input, for instance, influenced substantially CCA's strategy to such extend

that for the first time a holistic perspective on the sector is taken, including transitional and clean cooking solutions as well as national and local stove companies.

The collaboration with the CCA and GET.invest will be continued in 2021. In 2020, EnDev participated in the *Clean Cooking Investment series*, a two-day event hosted by the two partners that covered topics ranging from investment readiness and asset financing to RBF and consumer demand, and organized, invitation of 35 private sector partners (stove producers and distributors from EnDev countries). These were selected as companies with growth ambition and potentials. An evaluation of this event will follow in 2021. The trajectory will be starting with a segmentation and categorization of private sector partners, with a *Clean Cooking Finance Masterclass*, which EnDev will organize together with GET.invest in May 2021 and the preparations for the planned *Clean Cooking Forum* in late 2021 which will also include specific sessions on investments.

On the level of private-sector collaboration the existing channels to and the cooperation with the *Global Off-Grid Lighting Association* (GOGLA) will be strengthened through a dedicated support for e-waste recycling in Kenya which will have the potential for replication at a regional level.

Besides, regular exchange on expert-level and common ad-hoc reactions to external challenges (c.f. the joint efforts on the *Energy Access Industry Barometer* in 2020) will be continued. Especially in the area of solar home systems and dedicated risk mitigation mechanisms (e.g. insurance for PAYGO companies) new opportunities are emerging and will be pursued.

EnDev will undertake a structured update of its partner mapping in 2021 to ensure that new international constellations and political and economic momentum in certain areas are duly captured. For example, the area of climate financing is rapidly developing as is the digital sector. These forces could potentially be better utilized to reach SDG 7 as well.

### **Contributing to a broader capacity base for SDG 7 through EnDev's learning and innovation agenda**

In 2021, EnDev will continue its learning and innovation agenda whose results are to be shared with the wider energy access community and are intended to contribute to a higher pace and impact of EnDev as well as other programs and initiatives. A focus will be given on productive use of energy and Humanitarian Energy. The learning agenda also aims to strengthen the positioning of EnDev in relevant international fora with the respective knowledge products. Also, in 2021, EnDev will decide on new thematic priorities for the next learning and innovation agenda cycle for 2022 to 2023.

EnDev will furthermore continue the implementation of the RVO-led *Innovation Fund* which targets EnDev implementers and focusses on the four thematic areas data and digitalisation, productive use, and leave no-one behind.

## 4. Safeguards and gender

A key element of EnDev's new strategy is the ambition to increase the programme's emphasis on leaving-no-one-behind, inclusiveness for poor and vulnerable population groups, with a specific focus on women and refugees. On impact level, a special emphasis is put on gender and specifically women's economic empowerment.



### **EnDev's safeguards and gender approach**

EnDev has already increased its aspiration level concerning safeguards and gender in the last year and is planning to continue this process in 2021 and onwards.

In line with GIZ's mandatory requirements, EnDev had to pass the internal process and clearance on safeguards and gender. The two-step process includes:

- A safeguards assessment on global level concerning environment and climate as well as a pre-assessment on global level regarding conflict and context sensitivity, human rights, and gender equality.
- An in-depth assessment for conflict and context sensitivity, human rights, and gender equality on country level. Depending on the technologies promoted (e.g. hydro power) and respective risks identified in step 1, an in-depth environmental assessment is required.

Relevant findings are reflected in the programming which has been concluded in the first quarter of 2021 and is presented in this report.

### **EnDev's ambition level on conflict and context sensitivity**

The conflict and context sensitivity assessment of EnDev is based on the escalation potential country matrix which is updated

annually by the *German Institute of Global and Area Studies* (GIGA) on behalf of the German government represented by the Federal Ministry for Economic Cooperation and Development (BMZ). In line with this and the safeguards and gender approach an in-depth integrated peace and conflict analysis for all its 21 target countries was an integral part of the programming process regardless of the escalation potential categorization.

### **EnDev's ambition level on gender**

EnDev is raising its ambition on gender equality by taking a more holistic approach: EnDev has embedded gender and gender-sensitive planning on country level as a special focus in its programming. In addition, EnDev country project proposals have been reviewed by external experts forming the so-called *Independent Technical Advisory Committee* (ITAC), including gender experts. This ensures an in-depth anchoring of programmatic gender equality in the conceptualization phase.

Additionally, to ensure that the gender-sensitive approaches developed in the programming are translated into concrete and successful interventions on the ground as well as to facilitate cross-project learning, EnDev has established a strategic partnership with ENERGIA, an international network of gender and energy experts hosted by HIVOS. In a first round, four selected countries – Benin, Ethiopia, Tanzania, and

Uganda – will receive hands-on operational support. Based on the results of the gender analysis, follow-up workshops with each of the teams to more comprehensively define the exact scope of their gender-sensitive intervention design will be conducted. In a next step, ENERGIA will provide guiding support for the drafting of a gender action plan (GAP). In the GAP, additional gender objectives and sub-targets will be defined to complement and augment the ones outlined in the gender analysis. Furthermore,

monitoring procedures to quantify and qualify effects by collecting gender-disaggregated data will be defined. ENERGIA will mentor the projects as well as provide technical backstopping in the implementation of the GAP. This will further raise the level of ambition for integrating gender equality in project implementation.

Additionally, ENERGIA will provide implementation support in terms of a gender helpdesk as well as strategic advice.

## (Em)powering municipal offices

An electrified town hall in Mali brings benefits not only to the “computer of the commune”

In the rural community of Tesserela, in the south of Mali, life is simple. Its eleven small villages can only be reached by dirt road, and most people live from farming, often sharing their harvest with each other. Here, 39-year old Tahirou Touré is known as the “computer of the commune”, because he manages every piece of official information that concerns the 6,500 inhabitants of Tesserela. Tahirou’s nickname was ironic at first: until last year, electricity used to be a luxury. When the battery of Tahirou’s computer died, he had to continue working on paper or drive 35 kilometres along a muddy road to Segou, the regional capital. When EnDev arranged for the installation of solar panels at the town hall in Tesserela in May 2018, the people were excited. EnDev worked in close collaboration with a local operator and local technicians, who installed ventilation in Tahirou’s office and in the meeting room. The circulated air now makes the temperature more bearable. At night, the exterior of the town hall is illuminated, which makes the neighbours feel safer. Solar power also benefits the community’s democratic processes: it is now easier for Tahirou and his colleagues to count votes during elections. With electric lights, they finished counting the votes of the 2018 presidential election hours earlier than before, submitting the results on time. Now, Tahirou’s nickname is justified at last: sockets in his office let him charge his laptop and he can now work in his office five days a week, providing an improved service for the commune. Soon, he will get a printer and new computers.





## 5. Reports and accounts

With this programming, EnDev proposes to allocate a total of EUR 431.835 million for continued global management as well as operations in 21 countries from 2009 until June 2022. This requires additional funds of EUR 10.092 million on top of available funds. Advanced negotiations with different partners suggest that additionally needed funds will be secured shortly.

### 5.1 Planned budget allocation

EnDev is governed by a BMZ commission to GIZ, which is currently administratively ending in December 2025. EnDev's total indicative and accumulated budget from 2009 until until 2025 sums up to EUR 470.132 million of which EUR 424.705 million have been secured and commissioned by BMZ, including co-financing from different donors. As EUR 2.962 million are reserved for exchange rate fluctuations, EUR 421.743 million are currently available for allocation. Therefore, the indicative budget until 2025 has currently a funding gap of EUR 48.389 million. However, EnDev aims to secure expected as well as probable additional non-earmarked funds of EUR 28.500 million in the near future. Once these funds are secured, EnDev's total

available funds will amount to EUR 450.243 million. Additional EUR 19.889 million will then still be required to continue implementation in long-term and medium-term countries as indicatively planned and in order to ensure a smooth implementation and full target achievement as projected.

Of EnDev's total indicative budget until 2025 of EUR 470.132 million, global level budget allocation sums up to EUR 53.913 million and country level budget allocation amounts to EUR 416.219 million. It should be noted that global level budget allocation also includes centrally managed country activities (e.g. SIINC) even though they are not formally part of the respective EnDev country projects.

Table 5-1  
Programming budget until 06/2022 in million EUR

	Total
<b>Global level budget</b>	
Management, monitoring, backstopping, learning, etc.	31.336
Globally managed country activities (SCCIF, SIINC, IKEA, etc.)	11.955
Globally managed extra activities (refugees, RBF preps, etc.)	3.882
<b>Country level budget</b>	
Implementation in medium-/long-term countries	299.054
Country-level managed extra activities (FCDO, EU, USAID, etc.)	85.608
<b>Total allocated budget</b>	<b>431.835</b>



Table 5-2

**Indicative overall budget until 12/2025 in million EUR**

	12/2020	2021	2022	2023	2024	2025	Total
<b>Global level budget</b>							
Management, monitoring, backstopping, learning, etc.	24.718	4.918	3.800	2.500	2.000	200	<b>38.136</b>
Globally managed country activities (SCCIF, SIINC, IKEA, etc.)	2.090	4.531	2.667	2.667			<b>11.955</b>
Globally managed extra activities (refugees, RBF preps, etc.)	3.172	0.650					<b>3.882</b>
<b>Country level budget</b>							
Implementation in medium-/long-term countries	253.508	29.397	23.461	15.911	8.210	125	<b>330.611</b>
Country-level managed extra activities (FCDO, EU, USAID, etc.)	61.868	13.980	4.260	2.250	2.250	1.000	<b>85.608</b>
<b>Planned expenditures</b>							
Global and country level	<b>345.356</b>	<b>53.475</b>	<b>34.188</b>	<b>23.328</b>	<b>12.460</b>	<b>1.325</b>	<b>470.132</b>
<b>Funding</b>							
Secured available funds (as of 04/2021) <sup>4</sup>	345.356	53.475	14.745	4.917	2.250	1.000	<b>421.743</b>
Expected additional funds (to be secured short-term)							<b>14.000</b>
Probable additional funds (to be secured medium-term)							<b>14.500</b>
<b>Funding gap</b>							
Required funds (as of 04/2021)							<b>48.389</b>
Required funds (if expected and probable funds are secured)							<b>19.889</b>

<sup>4</sup> Due to exchange rate fluctuations of contributions in foreign currencies (CHF, GBP, NOK, USD), 2.962 million are reserved for exchange rate fluctuations, resulting in available funds of EUR 421.743 million instead of the commissioned funds of EUR 424.705 million.

## 5.2 Planned activities

This chapter provides information on current country projects, durations, and budgets. Administratively, EnDev is governed by a commissioned programme phase of BMZ to GIZ. This phase is currently designed to end in December 2025. With this report, the project period for all country projects<sup>5</sup> is suggested to be extended until 06/2022.

With this interim project duration, the current funding situation of the programme is taken into account. Project durations will be extended, and budget allocations

increased respectively, once additional funding has been secured.










Ongoing country projects are shown in Table 5-3, and the proposed changes for individual country projects are listed in the column labelled “new”. Table 5-4 provides an overview of country projects phasing out. Management and thematic activities are presented in Table 5-5. Additional activities that commissioned separately but which are implemented in the context of the EnDev partnership are presented in Table 5-6.

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<sup>5</sup> Country projects for which phase-out had already been confirmed were excluded, even if their operations are still running, i.e. Indonesia (phase-out in 06/2021).

Table 5-3

## Ongoing country and regional projects

Country	Lead political partner	Project duration			Funding (in EUR 1,000)		Planned outcomes on HH level (in 1,000 persons) <sup>6</sup>	
		start	end old	end new	old	new	old	new
Bangladesh	 Bangladesh Ministry of Power, Energy and Mineral Resources	06/09	12/21	06/22	26,350	26,617	3,434	3,514
Benin	 Ministry of Energy	10/09	12/21	06/22	20,374	20,115	1,065	795
Bolivia	 Vice-Ministry of Electricity and Alternative Energy (VMEEA) of the Ministry of Energy	10/09	12/21	06/22	18,084	18,692	591	608
Burundi	 Suspended; focus on local private sector	01/21	12/21	06/22	0,250	0,257	-	79
Cambodia (with Laos)	 Cambodia: Ministry of Environment (MoE) and Ministry of Rural Development (MRD) Laos: Ministry of Science and Technology (MoST)	03/15	12/21	06/22	4,813	5,560	144	176
DRC	 Ministère de la Coopération Internationale, Intégration Régionale et Francophonie	12/19	12/21	06/22	0,900	1,072		99
Ethiopia	 Ministry of Water, Irrigation and Electricity (MoWIE)	01/10	12/21	06/22	40,837	43,480	2,420	2,549
Kenya	 Ministry of Energy	04/09	12/21	06/22	26,730	26,522	4,895	4,297
Liberia (with SL)	 Liberia: Ministry of Mines and Energy; Sierra Leone: Ministry of Energy	05/12	12/21	06/22	8,220	9,026	86	140

<sup>6</sup> Indicative target forecasts are not adjusted to the extended project duration. Indicative targets span a time horizon until end of 2023 and 2024 depending on the categorization as medium-/long-term involvement countries and are not broken down to mid-term (06/2022) targets.

Country		Lead political partner	Project duration			Funding (in EUR 1,000)		Planned outcomes on HH level (in 1,000 persons)	
			start	end old	end new	old	new	old	new
Madagascar		Ministère de l'Energie, de l'Eau et des Hydrocarbures	12/12	12/21	06/22	1,414	1,637	145	174
Malawi	 	Ministry of Energy / Ministry of Gender, Children, Disability and Social Welfare (for RBF)	12/12	12/21	06/22	9,041	8,263	1,513	1,764
Mali	 	Ministry of Water and Energy	04/09	12/21	06/22	10,682	10,918	169	310
Mozambique	 	Ministry of Mineral Resources and Energy	10/09	12/21	06/22	30,134	36,454	379	454
Nepal	 	Ministry of Energy, Water Resources and Irrigation	05/09	12/21	06/22	10,354	10,051	505	531
Rwanda	 	Ministry of Infrastructure (MININFRA)	10/09	12/21	06/22	24,786	30,297	753 <sup>7</sup>	460
Senegal	 	Ministry of Petroleum and Energy	04/09	12/21	06/22	23,798	22,597	1,800	1,404
Tanzania	 	Ministry of Energy	12/12	12/21	06/22	14,575	13,318	1,485	1,471
Uganda	 	Ministry of Energy and Mineral Development (MEMD)	04/09	12/21	06/22	15,943	16,268	915	1,372

<sup>7</sup> Old target was set including activities in Rwanda, Burundi and DRC. New target focusses on Rwanda.

Table 5-4  
Ending country projects

Country	Lead political partner	Project duration			Funding (in EUR 1,000)	Planned out-comes on HH level (in 1,000 persons)
		start	end old	end new		
Indonesia <sup>8</sup>	 Ministry of Energy and Mineral Resources (MEMR)	05/09	06/21	-	16,231	136

Table 5-5  
Management and thematic activities

Topic and/or country		Duration			Funding (in EUR 1,000)	
		start	end old	end new	old	new
Global level	Management, monitoring, backstopping, learning, etc.	01/09	12/21	06/22	29,776	30,562
Global level	Globally managed country activities (SCCIF, SIINC, IKEA <sup>9</sup> )	08/18	12/21	06/22	1,494	10,422
Innovation Fund	Bangladesh, Madagascar, Mali, Mozambique	11/18	06/21	-	1,250	

<sup>8</sup> Former Indonesia mini-grid project and Indonesia Biogas project merged in one line to reflect accounting logic.

<sup>9</sup> Lead political partners for IKEA-funded activities at country are: Ethiopia: Ministry of Water, Irrigation and Electricity (MoWIE); Kenya: Ministry of Energy; Uganda: Ministry of Energy and Mineral Development (MEMD).

Table 5-6

**Additional thematic activities outside EnDev**

	Topic and/or country	Project duration		Funding (in EUR 1,000)
		start	end	
<b>Promotion of climate-friendly cooking</b>	Kenya (GCF)	01/20	12/24	14,110
	Senegal (GCF)	01/20	12/24	13,203
	Global (GCF)	01/20	12/24	1,996



# Abbreviations

ADES	Association pour le Développement de l'Energie Solaire, Switzerland
AVSI	Association of Volunteers in International Services
BMZ	German Federal Ministry of Economic Cooperation and Development
CCA	Clean Cooking Alliance
CLASP	Collaborative Labelling and Appliance Standard Program
DFAT / AUSAid	Australian Department of Foreign Affairs and Trade
DGIS	Netherlands Ministry of Foreign Affairs and Trade
DFID	UK Department for International Development
DRC	Democratic Republic of the Congo
EnDev	Energising Development programme
ESMAP	Energy Sector Management Assistance Program
FCDO	UK Foreign, Commonwealth & Development Office
GAP	Gender Action Plan
GCF	Green Climate Fund
GIGA	German Institute of Global and Area Studies
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GOGLA	Global Off-Grid Lighting Association
HEPA	Health and Energy Platform of Action
HH	households
HIVOS	Humanistisch Instituut voor Ontwikkelingssamenwerking
ICS	Improved Cookstoves
ITAC	Independent Technical Advisory Committee
KOFIH	Korea Foundation for International Healthcare
LDC	least developed countries
LEAP	Lighting and Energy Access Partnership
MSME	small and medium enterprise
NGO	Non-governmental organisation
NIS	Nordic International Support Foundation
PAYGO	Pay-As-You-Go
picoPV	pico photo voltaic

PUE	productive use of energy
RBF	results-based financing
RVO	Rijksdienst voor Ondernemend Nederland
SCCIF	Smart Communities Coalition Innovation Fund
SDC / DEZA	Swiss Agency for Development and Cooperation
SDG	sustainable development goals
SHS	solar home systems
SI	social institutions
SIINC	Social Impact Incentive
SNV	Stichting Nederlandse Vrijwilligers / Netherlands Development Organisation
USAID	United States Agency for International Development

**Funded by:**



Ministry of Foreign Affairs of the Netherlands



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Agency for Development  
and Cooperation SDC

**Coordinated and implemented by:**



Netherlands Enterprise Agency

**Published by:**

Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

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As of: July 201, 2021  
(final version)

**Photos:**

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# Energising Development Programming Report 2021 Update Annex A

2021

### **Partnership between**

**The German Federal Ministry for Economic Cooperation and Development**

**The Netherlands Ministry of Foreign Affairs**

**The Norwegian Agency for Development Cooperation**

**The Swiss Agency for Development and Cooperation**

With co-financing from the **Australian Department of Foreign Affairs and Trade, the European Union, Icelandic International Development Agency, IKEA Foundation, Irish Aid, Korea Foundation for International Healthcare, Swedish International Development Cooperation Agency, the UK Foreign, Commonwealth and Development Office, and the United States Agency for International Development**

### **Coordinated and implemented by**

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Rijksdienst voor Ondernemend Nederland (RVO)

Association pour le Développement de l'Energie Solaire Suisse (ADES)

Association of Volunteers in International Service (AVSI)

Collaborative Labeling and Appliance Standard Program (CLASP)

Humanistisch Instituut voor Ontwikkelingssamenwerking (HIVOS)

Nordic International Support Foundation (NIS)

Practical Action

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# Introduction and content

In this Annex, country proposals are presented in alphabetic order. The proposals prepared in the course of the EnDev programming cycle 2020/2021, present an indicative planning until 2023 and 2024 respective the country categorization as mid- or long-term country.

EnDev is governed by a BMZ commission to GIZ, which is currently administratively ending in December 2025. Based on the results of the portfolio review conducted in 2020, EnDev country projects were thus

requested to initiate the programming for their new indicative project durations until 2023 and 2024 respective to their categorization as mid-term or long-term involvement country (see Table 1-1).

Table 0-1

## Portfolio review 2020 and proposed country categorization

Sub-Sahara Africa	Asia	Latin America
<b>Long-term involvement</b>		
<ul style="list-style-type: none"> <li>• Benin</li> <li>• Democratic Republic of the Congo</li> <li>• Ethiopia</li> <li>• Mali</li> <li>• Mozambique</li> <li>• Rwanda</li> <li>• Tanzania</li> <li>• Uganda</li> </ul>	<ul style="list-style-type: none"> <li>• Cambodia (with Laos)</li> </ul>	
<b>Medium-term involvement</b>		
<ul style="list-style-type: none"> <li>• Burundi</li> <li>• Kenya</li> <li>• Liberia (with Sierra Leone &amp; Guinea)</li> <li>• Madagascar</li> <li>• Malawi</li> <li>• Senegal</li> </ul>	<ul style="list-style-type: none"> <li>• Bangladesh</li> <li>• Nepal</li> </ul>	<ul style="list-style-type: none"> <li>• Bolivia</li> </ul>

With this programming, project durations for all EnDev country projects are proposed to be extended until 06/2022 and project budgets to be adjusted accordingly (see Chapter 5, Table 5-4 in the Programming Report 2021 Update). With this interim project duration, the current funding situation of the programme is taken into account. Project duration will be extended, and


budget allocation increased respectively once additional funding has been secured. For this reason, project period and indicative budgets in the proposals presented in Chapter 2 of this Annex do not match with the new project end and budget presented in Chapter 5, Table 5-3 in the Programming Report 2021 Update.

# 1. EnDev country project proposals

- Bangladesh
  - Benin
  - Bolivia
  - Burundi
  - Cambodia with Laos
  - Democratic Republic of the Congo (DRC)
  - Ethiopia
  - Kenya
  - Liberia with Sierra Leone and Guinea
  - Madagascar
  - Malawi
  - Mali
  - Mozambique
  - Nepal
  - Rwanda
  - Senegal
  - Tanzania
  - Uganda
- 

# 1.1 Bangladesh

## 1.1.1 Summary and key data

Promoted technologies			
Summary of proposed interventions(s)	<p><b>E-cooking component</b> (approx. 70 % of the intervention)</p> <p><b>Market acceleration for e-cooking appliances</b>            EnDev and its partners (Modern Energy Cooking Systems (MECS), Practical Action (PA), maybe also CLASP, Clean Cooking Alliance (CCA)) contribute to the nascent market for high-quality e-cooking appliances by</p> <ul style="list-style-type: none"> <li>• supporting Sustainable and Renewable Energy Development Authority (SREDA), with finalising its standards and labelling scheme for e-cooking appliances;</li> <li>• setting up an RBF scheme to strengthen the rural markets for high-quality on-grid e-cooking appliances; and</li> <li>• implementing an awareness and consumer education campaign about e-cooking in a focus region.</li> </ul> <p><b>ICS component</b> (approx. 20 % of the intervention)</p> <p><b>Supporting policy improvement and to commercial ICS dissemination</b>            EnDev builds upon its decade long support to building the clean cooking sector by</p> <ul style="list-style-type: none"> <li>• assisting SREDA in the swift implementation of the National Action Plan on Clean Cooking and in stakeholder coordination;</li> <li>• extended phase out of support to BBF focussing on sustainability (improving its female expert-based ICS maintenance programme 'Bondhu Chula Doctors') and the further development of a business model for commercial ICS, to ensure independent continuation of this EnDev success story - also after COVID-19.</li> </ul> <p><b>Battery charging component</b> (approx. 10 % of the intervention)</p> <p><b>Demonstration of rural solar charging business case opportunities</b>            Complementary to ongoing support to SREDA by GIZ energy programmes, EnDev develops and demonstrates business cases for solar battery charging stations for e-rickshaws by</p> <ul style="list-style-type: none"> <li>• analysing the competitive advantages of stand-alone and grid connected (net metering) solar battery charging.</li> <li>• implementing one demonstration project each for on-grid (net-metering) and off-grid solar battery charging stations.</li> <li>• targeting relevant stakeholders (e-rickshaw operators, utilities, local government, local financial institutions) with awareness and training activities to facilitate replication and scale-up.</li> </ul>		
	<b>Quantitative targets [# of]</b>		<b>Further relevant impacts/outcomes</b>
Cooking / thermal energy for households	230,000 additional	People	2 voluntary EE standards and label for e-cooking appliances have been approved by SREDA. Pilot experience is analysed for replication.
Electricity for productive use / income generation	32 additional	(M)SMEs	Solar battery charging business case demonstrated for replication
Cooking for productive use / income generation	6,600 additional	(M)SMEs	1,500 jobs as Bondhu Chula Doctors are created, thereof 100 % for women.
Project period	01.01.2021 – 31.12.2023	<b>Indicative Budget</b>	<b>2,250,000 EUR</b>

## Introduction

Bangladesh has seen robust economic growth (8.2 % in 2019), aspires to become a middle-income country soon, and is going to reach 100 % grid coverage in 2021. Although still 30 million households are cooking with traditional stoves today, the Government of Bangladesh (GoB) targets for clean cooking are ambitious and aim for 45 % of households cooking with ICS, 60 % with LPG, and 8 % with electrical cooking until 2030<sup>1</sup>. The country's progress poses challenges, but also opportunities for an energy access programme like EnDev.

Bangladesh is observing a growing market for e-cooking appliances, but dominated by low-quality products with a high energy consumption (and thus a large carbon footprint in a fossil fuel-based power grid). The GoB is planning a standard and labelling scheme for electric appliances that will initially remain voluntary and covering only few e-cooking appliances. EnDev can contribute to making this new market more sustainable by an e-cooking market transformation package composed of policy advisory, results-based financing (RBF) and a consumer awareness campaign. Ideally, this should be a package proposed to the GoB as a multi-party initiative from EnDev, MECS, CLASP and PA, maybe even SNV and the CCA. While the first small-scale phase can be kick-started with EnDev funding alone, there are prospects of co-financing e.g. by UK Aid/FCDO, and the structure (gradually handed over to SREDA to ensure institutional sustainability) should be able to accommodate additional funding later on to scale impact. The intervention package on e-cooking has promising potential to lead to transformative change over the next ten years, but will only deliver relatively small new access figures until end of 2023. Beyond Bangladesh, the intervention would deliver new lessons learned for EnDev as a global programme on how to develop markets for energy efficient and high quality on-grid e-cooking appliances.

Since 2005, EnDev has supported the biomass-based improved cookstove (ICS) sector in Bangladesh by policy advisory, market building and by setting up the Bangladesh Bondhu Foundation (BBF) as one major player disseminating tier 2 ICS. Based on the successful acquisition of carbon financing, EnDev developed an exit strategy for BBF by 2020. However, COVID19 has led to slumping sales and delays in BBF's programmes increasing the BBF's risk to default on the carbon contracts. Therefore, an extended exit strategy until 2023 is proposed, focusing on key results relevant for EnDev: promotion of ICS for commercial customers and the accompanying maintenance programme ('Bondhu Chula Doctors') to increase sustainability and gender sensitivity of interventions. The support will be considerably downscaled (up to 200,000 EUR for a 2.5-years period) and phased-out by end of 2023.

In the electricity sector, facilitating access is no longer required, but options were assessed whether EnDev could still contribute to a reliable, clean, efficient and productive use of electricity. With regard to grid reliability, utilities are sufficiently supported by development partners (World Bank, ADB, KfW, and AIIB). Several donors are financing the addition of solar and other RE generation capacities and a net-metering regulation was approved in 2018. EnDev could build on the work of GIZ energy projects<sup>2</sup> and facilitate investments in solar battery charging stations for e-rickshaws (1.8 million on roads already) in peri-urban and rural areas. This would improve the cost and energy efficiency of existing e-rickshaws as the current poor

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<sup>1</sup> Totals do not add up to 100 % due to stove stacking.

<sup>2</sup> The Renewable Energy and Energy Efficiency Programme II (REEEP II) supports PV net-metering, while the Energy Efficiency and Grid Integration of Renewable Energy Project (EERIRE) supports the development of battery charging guidelines.

charging practice is significantly reducing battery lifetime. EnDev could account supported battery charging stations as SMEs and rickshaw drivers that benefit from improved battery lifetime as micro entrepreneurs. This proposal suggests a small-scale intervention to demonstrate the business and financing model. Once proven, this business case could be up-scaled for Bangladesh or transferred in other countries with e-mobility potential (e.g. Rwanda, Ethiopia, Liberia, Nepal, Cambodia).

## 1.1.2 Theory of change (ToC) and state of market

### Cooking sector

The draft National Action Plan (NAP) for Clean Cooking in Bangladesh 2020-2030 has been prepared by the Sustainable and Renewable Energy Development Authority (SREDA) in December 2019; it is expected to be ratified in early 2021. The NAP aims at 100 % clean cooking by 2030 and gives specific sub-targets (total is >100 % due to stove stacking), e.g. around 45 % of total households or 19 million households cooking with Improved Cookstoves (ICS) and about 8 % of total households or roughly 3,5 million households cooking with electric appliances by 2030. As in other countries, Bangladesh households tend to use e-cooking appliances along with LPG, piped gas, ICS and/or traditional cooking systems. Usage of e-cooking appliances will gradually lead to less usage of other cooking systems.

EnDev plans to support SREDA for the swift implementation of the NAP with a focus on e-cooking. SREDA is currently finalising the framework regulation for energy performance standards and labelling (S&L). The Bangladesh Standards and Testing Institution (BSTI) starts standard development for appliances in mid-2021. On the priority list are AC rice-cookers, induction stoves and microwave ovens, but SREDA signalled openness towards including standards for other e-cooking appliances as well. EnDev will support BSTI with standard development and testing procedures for mature technologies like rice cookers and induction stoves, and less mature technologies like electrical pressure cookers (tbc). Once national standards are available, SREDA will first introduce these on a voluntary, later on a mandatory basis, and will also introduce a labelling scheme and a consumer campaign. The GIZ Renewable Energy and Energy Efficiency Programme II (REEEP II) supported SREDA in the preparation of the EE S&L scheme, but is ending in October 2021 (February 2022, taking the aspired extension through BMZ into account). Therefore, SREDA is lacking support in the crucial initial implementation phase, which EnDev could provide.

The ambitious grid extension plan (100 % reached in 2021), improvements in grid reliability, and the increasing purchase power of households has led the emergence of a still small, but quickly emerging e-cooking appliance market. According to a draft market mapping study of Practical Action (PA) conducted for the Modern Energy Cooking Services (MECS) programme at end of 2020, most popular e-cooking appliances are rice cookers (approx. 800,000 sold in 2019) and induction and infrared cookers (50,000 sold), while so far few electric pressure cookers are sold (mechanical pressure cookers have a high market share with 670,000 sales). At the supply side, one can find imported international brand products, locally assembled international brand products, locally manufactured brand products, and non-branded products of local or international origin. Due to the high import tariffs on electronic goods (96 %), locally assembled and manufactured products are dominating the market and non-branded low-quality products diminish customers' perception and afflicts usage patterns. Low quality products

are most abundant in rural areas where customers are more price sensitive and where established brand suppliers have not yet extended their distribution networks. Sales are cash-based, consumer financing does not target cooking appliances yet. A results-based financing (RBF) scheme can help to scale markets for known technologies like rice-cookers and induction stoves and kick-start markets for less-known technologies like electrical pressure cookers. The objective of the RBF would be to increase marketing activities and sales structures in rural areas; only products that meet the quality aspects of the yet to be established standards will be eligible.

In addition, customers do not know how to distinguish quality products from non-quality products, are often unaware of their cost saving potentials, and are hesitant to change cooking habits. An awareness and consumer education campaign can help to mitigate these demand side barriers.

Barriers to NAP target achievement for biomass-based ICS are manifold and include, among others, the set-up of testing facilities for the new ISO standards, ICS maintenance issues, and general price sensitivity of the typical ICS customers. Although the Infrastructure Development Company Limited (IDCOL) and Bangladesh Bondhu Foundation (BBF) run large tier 2 – tier 3 ICS dissemination programmes<sup>3</sup>, there is still a gap of 16,3 million households between the current and the NAP envisaged adoption rate. BBF's carbon project to install 6 million ICS by 2023 is progressing (1.54 million units until 12/2020) despite huge COVID-19-related challenges and the resulting sharp decline in installations from April to September 2020. Even more, due to COVID-19, the progress of its ICS maintenance programme with mainly female service providers (so called 'Bondhu Chula Doctors') is delayed and cannot ensure that BBF's ICS are indeed used for their full lifetime of 5 years (contractual obligation from the carbon project). BBF is also keen to re-establish its marketing of larger stoves for SMEs to further advance clean cooking in the commercial sector (demand collapsed due to the COVID-19-related close down of restaurants and tea stalls).

With regard to impacts, high quality and energy efficient e-cooking appliances (rice cookers, pressure cookers, induction stoves) come with benefits such as improved energy efficiency, safety and convenience. They mitigate negative impacts of business-as-usual market growth for inefficient and low-quality e-cooking appliances. In the mid-term, the fossil footprint of national grid is also expected to decrease (energy transition). Biomass-based ICS of BBF use less fuel and emit less greenhouse gases than traditional cookstoves and have positive health effects – ensuring their usage due to good maintenance for their full lifetime of 5 years warrants their full impacts.

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<sup>3</sup> The ICS of BBF are biomass-based cookstoves with 1-3 moulds and a chimney. In the past, BBF stoves were categorised as tier 2 stoves based on testing results according to IWA 2012 standard. Testing of the revised BBF stoves according to the new ISO standard 19867 is still pending, due to absence of testing facilities according to the new standards in Bangladesh and in the South Asia region. However, EnDev is in dialogue with headquarter as well as other potential countries to have these stoves tested.



Theory of Change - Clean Cooking - EnDev Bangladesh											
Impacts	Energising Lives - Social development			Energising Opportunities - Economic development			Energising Climate - Combating climate change				
<b>Assumptions</b>	Improved cookstoves and clean cooking solutions use less fuel, emit less greenhouse gases, and reduce health impacts. Benefits (safety, convenience, efficiency) of high-efficient e-cooking appliances (rice cookers, pressure cookers) in stacking combinations outweigh the negative impact of fossil footprint of national grid (which is expected to decrease in the mid-term).										
<b>Sub-sector</b>	E-cooking			LPG		Processed biomass-based		Non-processed biomass-based ICS			
<b>Outcome</b>	8-10% of population cooking with electricity by 2030			68 - 79% of population cooking with gas (LPG & natural gas)		2-3% of population cooking with ICS using pellets, briquettes, biogas		38-50% of population cooking with ICS		Increased number of SMEs are using ICS	Improved sector coordination and regulatory environment for ICS
<b>Assumptions</b>	Electricity price remains affordable, the S&L programme first introduced on voluntary, later on mandatory basis, and MEPS are periodically reviewed and increased by SREDA			LPG and NG prices remain affordable		tier 3/4 ICS demonstrate economic advantage in comparison with LPG stoves & e-cooking		Economic development leads to increased purchasing power of low-income HH and increases WTP for ICS	Mandatory ISO testing will improve quality and efficiency of ICS	More SMEs use ICS for their life-time of 4 years, and are willing to re-invest in new a stove	
<b>Outputs and results</b>	EE standards and labels are introduced and ratio of high-quality products on market increases	Suppliers enter rural markets on a national scale and offer higher quality products at better prices	Rural and lower-income groups increase their demand for high-quality e-cooking appliances	Increased stability and reliability of the distribution network enables increased load demand for e-cooking	Private companies expand their rural LPG sales infrastructure with affordable product range (annual growth rate of 8-10%)	Private sector expands market for pellet & briquette supply, tier 3/4 ICS, and biogas	ICS of BBF partners are used for their full life-time of 5 years; improved customer satisfaction and willingness to replace ICS with a new one; programme improves income situation of female service providers	Cost of ISO testing of ICS greatly reduced	BBF manufacturers improved marketing and sales numbers for commercial ICS	SREDA's role is strengthened; targets of NAP more likely to be reached	
<b>Key interventions</b>	Support SREDA and BSTI with finalising its standards and labelling scheme for all popular e-cooking appliances	RBF Scheme for suppliers to market high-quality e-cooking appliances in selected rural areas	Awareness and consumer education campaign on e-cooking appliances	Support BREB in investing in line overhaul, transformer replacement, and better load management of rural distribution net (WB, ADB, KfW, AIIB)	Tax exemptions for LPG imports and reduction in Advance Income Tax (AIT) from 5 to 2 % (GoB)	Improve cost-efficiency of briquette making; develop supply chain and business model (SREDA, IDCOL)	Build ICS maintenance network of 'Bondhu Chula Doctors' of female service providers	Build testing capacities for new ISO standard (SREDA, IDCOL)	Strengthen BBF manufacturers in their sales strategies for commercial ICS	Support SREDA in NAP implementation with focus on e-cooking	
<b>Barriers</b>	<b>Enabling environment barrier</b> National EE standards and label for popular e-cooking appliances (induction stoves, EPCs) not get existent	<b>Supply side barrier</b> Nascent market for e-cooking appliances is not reaching rural areas and is spoiled by low-quality products	<b>Demand side barrier</b> Low demand and WTP for high-quality e-cooking appliances	<b>Enabling environment barrier</b> Poor stability and reliability of low-voltage distribution network	<b>Demand side barrier</b> Affordability for low-income households and availability in remote rural areas	<b>Demand side barrier</b> Limited acceptance of faecal sludge-based briquettes by HH; briquette stoves not used by HH yet	<b>Supply side barrier</b> After-sales services are not offered by ICS manufacturers leading to discontinued usage of stoves	<b>Enabling environment barrier</b> ISO standard for ICS of 2018 not yet adopted; no national testing facilities certified for ISO testing	<b>Supply side barrier</b> Limited awareness of economic benefits by SME; ICS production processes are not sufficiently standardised to allow cost savings	<b>Enabling environment barrier</b> Clear Roadmap for NAP on Clean Cooking missing, especially on e-cooking market development	
<b>Assumptions</b>	GoB prioritises most common appliances (TV, fans, rice cookers) for its upcoming standards and labelling scheme	Due to high competition in urban areas, suppliers have long-term interest to cater to rural areas	HH customers are concerned about economic savings, health, safety, and cooking convenience	Distribution companies interested to increase power consumption of rural HH due to e-cooking, increasing public pressure to improve grid reliability	LPG suppliers interested to expand business to rural areas.	Introduction of communal sanitation systems makes faecal sludgy widely available as briquetting feed	After-sales services are not priced in the sales price due to price sensitivity of HH.	SREDA and IDCOL both plan to set-up national capacity for ISO testing	ICS manufacturers are keen to expand their sales to SME clients	New NAP for Clean Cooking is to be approved in early 2021 with significant e-cooking targets	
<b>Root cause</b>	Poor quality of many domestic electric appliances; high import duties on international products that may come with better quality	Low WTP of rural customers and higher logistical costs result in low profit margin for sales of quality appliances in rural areas	Little knowledge on economic benefits, health impacts, and correct use of use e-cooking appliances. Benefits for female users are not sufficiently considered by male household heads	First priority of national grid policy has been on generation, transmission and grid extension	High upfront and refill costs of imported LPG, safety hazards, and costs of accessing remote rural areas	The low-income HH segment prefers unprocessed biomass stoves; better-off HH prefer LPG & e-cooking	ICS of BBF are used by lower-income HH with a high price sensitivity	Missing standardised ICS test procedure prevents benchmarking and improvement of existing stove models	Cost-benefits of using ICS in comparison to traditional stoves are not well known by SMEs	Weak sector coordination could not sufficiently focus the significant sector investments on key bottlenecks (NAP 2013)	
<b>Core problem</b>	75% of the population (in 2019/20) is still depending on inefficient biomass cookstoves resulting in negative environmental impacts and large numbers of premature deaths due to indoor air pollution										

## Electricity sector

Since 2019, Bangladesh's energy access sector has undergone dramatical changes. With a massive grid roll-out over the last decade, Bangladesh is expected to reach 100 % electricity access in 2021. This success also caused the end of the largest off-grid solar market promotion programme in the world. Instead, the government is currently providing free solar systems to remote rural households not reached by grid extension or mini grids. This is further eroding the already weakened off-grid solar market, and most solar companies have shifted their attention to grid connected solar power. Electricity generation in Bangladesh is mostly fossil fuel based, of which by 2019 two third has been natural gas. RE generation is hampered by low hydropower potential and land scarcity for large scale PV investments. Grid electricity is highly subsidised (rural life line tariffs starting at 3.7 EUR Cent per kWh), but confronted with increasing costs, the government is expected to increase prices in the coming years.

Poor grid stability remains an issue especially in the rural distribution network managed by the Bangladesh Rural Electrification Board (BREB). But supply reliability is receiving more public attention and BREB is currently implementing massive additional investments for line overhaul, transformer replacement, and load management automation, supported by World Bank, ADB, KfW, and AIIB. While improvements in grid reliability can be expected, existing growth trends for e-mobility and e-cooking will place a growing burden on the distribution network. Distributed solar generation close to rural load centres can help to mitigate some of this demand growth.

Representing a main competitor for off-grid solar in the past, the expanded and improved distribution network is now opening a new opportunity for solar investments. Since the introduction of the net-metering regulation in 2018 (supported by GIZ REEEP II), about 1,240 net-metering systems have been connected by early 2021 (of which 204 are in the BREB network) with a total capacity of 23 MW (average size 18 kW). However, most of these have been existing installations and few new investments have so far been made based on the new net metering rational. While net-metering is until now limited to 3-phase connections, the Ministry of Power, Energy and Mineral Resources (MPEMR) is planning to allow single-phase customers in the future.

Barriers to a wider adoption of distributed PV generation in rural areas are the low electricity tariff resulting in payback periods beyond 5 years, while most rural businesses are rather cash constrained. A soft loan for solar net metering investments is offered by IDCOL (2-year grace period, 8-year payback, 6 % interest) but has not yet been much used.

As a frontrunner, solar irrigation is expected to further pave the way for rural net-metering, as it greatly improves the viability of PV investment considering the only seasonal operation of irrigation pumps. One of the two large-scale programmes on solar irrigation is actually implemented by BREB itself with support of ADB and has a target of 2,000 solar irrigation pumps. Due to the significant ongoing development partner support to solar irrigation, an EnDev contribution does not seem to be of added value.

Theory of Change - Electricity - EnDev Bangladesh						
	Energising Lives - Social development		Energising Opportunities - Economic development		Energising Climate - Combating climate change	
<b>Impacts</b>	Improved energy services: information (ICT), entertainment (TV, music), comfort (fan), quality lighting for studying, household chores, micro-economic activities, safety		Increased rural economic activity, increased viability of battery charging business case, increased penetration of e-mobility into rural areas		Reduced GHG emissions (replacing 95% fossil grid power with clean solar PV generation)	
<b>Assumptions</b>	Households can afford the purchase of electric appliances	BREB is successfully managing growing shares of distributed generation in the rural distribution network.				
<b>Sub-sector</b>	<b>Household access</b>	<b>Power distribution</b>	<b>Solar Rooftop net-metering</b>	<b>Solar irrigation pumps</b>	<b>Battery charging for e-mobility</b>	
<b>Outcome</b>	Even low income households in remote rural areas have access to electricity	Reliable grid enables PUE and net-metering in rural areas	Net-metering is increasingly applied to improve financial viability of investments in power supply for rural businesses		The business model for solar battery charging (off-grid and/or grid connected net metering) is increasingly replicated also in peri-urban and rural areas	
<b>Assumptions</b>	Household electricity price remains affordable (life line tariff at 0.037 EUR/kWh for the first 50 kWh per month).	BREB can manage distributed generation and load growth in it's network	MoP plans to soon allow net-metering even for single-phase customers	Net-metering of solar irrigation systems increases BREB's experience with distributed generation	Ricksha operators get interested, local government, Fis, and utilities support business case	Reduced tariff for battery charging stations and increased battery life-time provide incentive to private sector to comply with technical standards
<b>Outputs and results</b>	100% electricity access is expected to be reached soon in 2021	Increased stability and reliability of the rural distribution network	Demonstrate technical feasibility of feed-in of small solar power		Demonstrated business case for solar battery charging for e-rickshaws	Utilities are prepared to manage larger charging capacities in their networks, number of charging cycles of batteries is increased
<b>Key interventions</b>	Support of utilities and local government with grid extension, mini-grid development, free dissemination of SHS (WB, ADB, KfW, UNDP)	Support BREB in investing in line overhaul, transformer replacement, and better load management of rural distribution net (WB, ADB, KfW, AIB)	Solar Rooftop market development (SREDA/GIZ REEEP 2)	Two large solar irrigation projects are currently implemented by IDCOL (10,000 pumps) and BREB (2,000 pumps), both include net-metering (WB, KfW, USAID, ADB, JICA)	Technical and commercial feasibility study, implementation of two demonstration projects, awareness rising and stakeholder facilitation (ricksha operators, utilities, Fis, local government) in selected rural areas	Support SREDA to introduce technical standards for battery charging of e-vehicles and Li-ion battery recycling (GIZ EEGIRE)
<b>Barriers</b>	<b>Supply &amp; demand side barrier</b> High cost of power supply in remote rural areas and low purchasing power of rural population require high subsidies	<b>Enabling environment barrier</b> Poor stability and reliability of low-voltage distribution network	<b>Enabling environment barrier</b> Limited experiences with feed in and net-metering of distributed solar power		<b>Demand side barrier</b> Low awareness and understanding of the business case, costs, and limited access to finance, low electricity tariff	<b>Enabling environment barrier</b> Poor stability and reliability of low-voltage distribution network
<b>Assumptions</b>	The 100% electrification target is a national policy priority	Increasing public pressure to improve grid reliability.	BREB is afraid that distributed generation might further destabilise the distribution network	Grid connection of solar irrigation pumps using net-metering can greatly increase their financial viability	Solar PV can improve the reliability for a rural e-vehicle charging station and reduce/stabalise electricity costs	Poor charge controllers burden the network and reduce battery life time
<b>Root cause</b>	Few islands and remote rural areas, as well as settlements in flood prone areas cannot be reached by the main grid	Network has only recently reached many rural areas and past reliability of rural power supply has been poor	Expectation of soon to be available and subsidised grid power slows investment in stand-alone supply, while net-metering is not yet possible for single-phase customers	Bangladesh employs about 1.6 Mio irrigation pumps, of which almost 80% are diesel driven. The 1700 solar powered irrigation pumps required high subsidies due to the limited irrigation season	The increasing stock of e-rickshas in rural Bangladesh are mostly charged via household grid or small business connections using poor charge controllers	
<b>Core problem</b>	Reliable access to electricity is still limited in remote rural areas		Insufficient investments in energy efficient productive use of electricity hamper socio-economic development in rural areas			

	EnDev intervention
	Non-EnDev intervention

Battery charging for e-rickshaws has been identified as a potentially scalable business case for an EnDev supported productive use of energy (PUE) component. In Bangladesh, e-rickshaws represent a not yet regulated, but highly dynamic market that is gradually expanding from urban to peri-urban into rural areas. E-rickshaws are mostly locally manufactured 3-wheelers using domestic lead-acid batteries and can transport 4-6 passengers. With more than 1.8 million e-rickshaws in operation and a strong growth trend, they also pose a growing burden on the distribution network. Poor charging practice greatly reduces battery lifetime from possible 3 years down to 6 months, causing increased battery waste and related environmental impact.

Solar charging stations can reduce the grid load, reduce the fossil footprint of e-rickshaws, increase reliability of battery charging, and reduce lead-acid battery waste. Advantages and disadvantages of lead-acid versus Li-ion batteries in the local context will be considered as part of the technical feasibility study. In contrary to lead-acid batteries, there is so far no policy and technical capacity for recycling of Li-ion batteries in Bangladesh (SREDA has recently requested GIZ EEGIRE to support respective development of guidelines). Competitive advantages of grid-connected (net-metering) versus off-grid solar battery charging will be analysed as part of a financial feasibility study. In any case does the investment in solar PV offsets the risk of future electricity price increases (which are likely due to the high cost of over-capacities in power generation and low load densities in the rural distribution networks).

### 1.1.3 Transformative character

#### E-cooking component

The commitment of the GoB to e-cooking in combination with an existent, albeit nascent market for on-grid e-cooking appliances pose a window of opportunity for EnDev and its partners to contribute a substantial market transformation. The business-as-usual scenario is a market expansion for energy inefficient, low-quality e-cooking appliances, mainly available in urban areas. By supporting the GoB to set up ambitious energy performance and quality standards for selected e-cooking appliances and by scaling the market with the help of an RBF scheme and an awareness and consumer education campaign, EnDev can contribute to a lasting transformation of the e-cooking market.

#### ICS component

EnDev Bangladesh aimed to use carbon financing as exit strategy to make BBF's stove operations commercially and financially sustainable. However, the COVID-19 pandemic is putting BBF's financial sustainability at risk. A continued support from EnDev can help BBF to bridge these risky times until the income disruptions to households and (M)SMEs due to COVID-19 have faded. The program does not explicitly target the poorest households but focuses on peri-urban and rural areas where the proportion of poorer people are higher. BBF's ICS maintenance programme contributes to women empowerment by creating additional income-generating opportunities for female 'Bondhu Chula Doctors'. BBF will also further increase its efforts to promote the sales of the larger stoves, especially for (M)SME such as small road restaurants, tea shops and hostels. The possible carbon savings for these larger stoves are estimated 27 times higher as a typical household stove and pay back periods based on savings of wood fuels are less than six months. This has also potential to become part of a carbon program and ensure longer term sustainability.

#### Battery charging component

Provided a robust business case can be identified, solar battery charging for e-rickshaws could greatly contribute to mitigate the fast-growing power demand of e-mobility which threatens to destabilise the distribution networks. Increased shares of PV generation also contribute to decarbonising e-mobility and to reduce air pollution by fossil fuel power plants. Reliable and continuous access to electricity, possibly in combination with net-metering, provides new opportunities for e-rickshaw operators in rural and peri-urban areas.

### 1.1.4 Collaboration

#### Clean cooking sector

##### Sector alignment

The planned EnDev interventions are in line with the GoB's NAP on Clean Cooking which aims at 100 % clean cooking by 2030 and gives specific sub-targets, e.g. around 45 % of total households or 19 million households cooking with biomass-based ICS and about 8 % of total households or roughly 3,5 million households cooking with electric appliances by 2030. The EnDev interventions will contribute toward these targets through the planned intervention package for expanding the market for on-grid e-cooking appliances and the promotion of

BBF's ICS maintenance programme ('Bondhu Chula doctors') and BBF's marketing for commercial ICS.

EnDev has a well-established cooperation with SREDA (e.g. previous support to the Household Energy Platform) and continues supporting the authority in its mandate to finalize and implement its standard and labelling scheme for energy efficient appliances, especially for e-cooking. BSTI will be the partner for the technical development of standards.

EnDev aims at developing an e-cooking support package in close collaboration with MECS, PA and possibly SNV and/or CLASP. Initial discussions with MECS have confirmed their interest. Their planned research on cooking habits in Bangladesh and neighbouring countries can inform the EnDev e-cooking awareness campaign; they also intend to work on e-cooking policies in Bangladesh with SREDA. FCDO Bangladesh is also interested to support the e-cooking sector, discussions are still outstanding. Any additional funding may enable EnDev to upscale the planned RBF and awareness campaign to national scale.

For the overall alignment and sparring on strategies in the stove sector, EnDev will maintain the solid collaboration with the Clean Cooking Alliance (CCA) which plays a key role in the strategy formulation and the ongoing review of the Country Action Plan for Clean Cooking.

### **Implementer base**

EnDev will contribute towards the national targets through BBF, which is one of the two large actors in the cookstove sector having installed over 2.6 million stoves since 2007. The carbon funding allows BBF to add another 6 million stoves in the period 2018-2023 (until now thereof already 1,5 million). EnDev is encouraging BBF to participate in coordination meetings launched by SREDA as the sector's coordinating body. The other major actor on the national stove market is IDCOL, which targets in principle the same cookstove market as BBF. It receives support from the World Bank/Green Climate Fund (\$40 million) and has a target of an additional 4 million stoves by 2023. IDCOL works through partner organisations spread over the country which promote a range of models and the focus is on mobile stoves without chimney. The number of ICS sales by other market participants (NGOs and private sector) not connected to BBF and IDCOL is marginal in comparison.

EnDev will engage with Practical Action (PA) for the awareness campaign on e-cooking. PA has much experience globally in cooking energy and has a strong presence in Bangladesh with about 150 staff. At end of 2020, PA has supported MECS in conducting a mapping of the modern cooking appliance market in Bangladesh. Building on this specific expertise and its general action research profile centring on poor and rural households, it seems in a good position to design an awareness campaign targeting potential rural e-cooking appliance customers.

### **Leverage**

The potential for carbon funding for an ICS programme targeting commercial SME will be assessed. A market development approach for e-cooking will leverage private sector investments (by household customers) in the purchase of e-cooking appliances.

## **Nexus**

The switch from traditional cookstoves to ICSs, and the switch from ICS to e-cooking has an important health component as it reduces indoor air pollution in the kitchen which is a major cause for premature deaths especially from women and children who are most exposed to these toxic fumes. The EnDev contribution to BBF's Bondhu Chula Doctor programme helps 1,500 women to improve their income situation and thereby empowers them in family and social standing.

## **Electricity sector**

### **Sector alignment**

The planned EnDev intervention promotes solar battery charging for e-rickshaws as a commercial business cases in peri-urban and rural areas and is in line with the National Energy Policy (NEP) of 2004 and the draft National Solar PV Roadmap, 2021 – 2041. While the NEP set an (unreached) 10 % generation target for renewable power by 2020 (currently around 1,5 %), the Roadmap recommends then swift scale-up of grid-connected roof-top solar to 500 MWp and the consideration of single-phase connections, financial incentives and national awareness campaigns to increase scale. Furthermore, the roadmap recommends to prioritize solar charging stations.

GIZ REEEP II has been a long-term partner of SREDA to develop the solar rooftop programme in the first place and is supporting implementation and monitoring. GIZ's Energy Efficiency and Grid Integration of Renewable Energy (EEGIRE) project is supporting SREDA to introduce technical standards for battery charging of e-vehicles as well as for battery recycling. EnDev can build on achievements and contacts of both GIZ programmes and will perfectly complement the gaps in peri-urban and rural areas that have not yet been adequately addressed.

### **Implementer base**

EnDev will continue its close cooperation with SREDA, involve BREB, financial institutions, local government and will identify private sector partners in selected rural target regions.

### **Leverage**

Supported by several development partners, IDCOL is offering preferential financing for investments of net-metering. Investors in grid connected solar battery charging stations can be supported to access the IDCOL financing. Commercial banks are offering green financing soft loans supported by the Government which also can be used to replicate and scale the demonstrated business cases.

## **Nexus**

The topic of battery charging has strong interfaces with grid operation (BREB, GIZ EEGIRE) and e-mobility in general: GIZ is planning a DKTi programme on e-mobility that will start in January 2022 and address the wider context of strategic development of the transport sector as well as the reduction of informality of the e-rickshaw sub-sector. The two interventions will closely cooperate in the promotion of demonstrated business cases and complement each other.



## 1.1.5 Modalities

### E-cooking component

EnDev aims at building a sustainable market for highly efficient, high quality on-grid e-cooking appliances by supporting a conducive regulatory framework, offering supply side results-based incentives as well as creating demand side awareness.

The focus is set on on-grid and not off-grid or weak-grid appliances in order to support Bangladesh in the market building for a product segment which will have long-term impacts in terms of health improvements, energy cost savings, fuelwood collection time savings, and GHG emissions abatement. Although at the moment grid reliability still pose barriers to large scale AC e-cooking appliance dissemination in rural areas, these challenges are mitigated by large support programmes (funded by WB, ADB, KfW, and AIIB) to BREB investing in line overhaul, transformer replacement, and better load management of the rural distribution grid. As these technical problems get solved, customers' demand for off-grid and weak-grid appliances will shrink. Accordingly, a transformative impact can only be expected to be achieved when focusing on a product segment for which long-term market expansion can be expected.

This component consists of three interventions:

Intervention (1) on 'standard & labelling' aims at the national level. Due to the limited available budget, the interventions (2) 'RBF for rural customers' and (3) 'e-cooking awareness campaign' are targeted at only one or two geographical areas, which are well-advanced on distribution grid improvements. Geographic coverage can be expanded once co-financing or EnDev upscaling become available.

- (1) Support to SREDA and BSTI on energy performance standard development, testing procedures and labelling for selected e-cooking appliances. In addition, standards might be broadened for covering durability, service and truth in advertising. Standards and labelling will be introduced first to mature technologies like rice cookers and induction stoves, and later for less mature technologies like electrical pressure cookers (final selection of appliances will be done after full market assessment is conducted). Activities will include:
  - a. A study comparing available standards, testing and labelling on selected appliance and recommending draft of Bangladesh standard to technical committees of SREDA/BSTI (possible implementing partner: CLASP);
  - b. Support to SREDA/BSTI in stakeholder dialogue and governmental approval process, and
  - c. Support to SREDA in coordinating the e-cooking sub-sector via HEP/HEP successor programme (both by EnDev).
- (2) RBF scheme for suppliers to enter rural areas and to sell appliances that meet EnDev's energy efficiency and quality standards, which will be the same as the ones developed jointly with BSTI. The RBF scheme pilots the new standards (which be published as voluntary standards by SREDA first before they become mandatory). The experience of manufacturers, wholesalers and retailers with the quality enforcement of the RBF scheme will increase their willingness to adhere to national standards once these become mandatory. The incentives for marketing and outreach activities targeting rural

customers will reduce their risk of entering these markets, enable learning about the rural customer segment, and may lead to decreased unit costs due to economies of scale. Activities will include:

- a. A full-scale market assessment building on the appliance mapping study done by PA/MECS and RBF design;
- b. (Optional) contracting of local FI as RBF Fund Manager and local consultants as independent verification agents (IVAs);
- c. Set-up of steering group with SREDA involvement;
- d. Implementation of RBF scheme (by EnDev). The overall objective of the RBF approach is market transformation. The grant money awarded on sales of high-quality cooking appliances is a reward for the set-up of rural distribution channels, marketing campaigns and other business expansion strategies. While suppliers may give short-time price reductions as part of their promotional campaign, they are supposed to sell their products at sustainable prices. Affordability to lower income households can be increased by consumer financing propositions such as payment-in-installments. This is not mandatory, but up to each suppliers' expansion strategy. The RBF scheme will use the standards recommended to SREDA as its product eligibility criteria. The RBF will also require suppliers (and manufacturers) to provide adequate after-sales services and warranties. The compliance with these requirements will be checked with the help of independent verification agents using phone interviews and field visits. In general, the proposed RBF scheme will follow the good practices as established by EnDev's RBF Facility.

In addition to the RBF scheme and its focus on downstream dissemination, EnDev will also encourage Bangladesh-based manufacturers to look for additional venture capital to cover pre-financing needs. Manufacturers could for example apply for the Clean Cooking Alliance's (CCA's) venture catalyst support<sup>4</sup>.

- (3) Awareness and behavioural change campaign on benefits of e-cooking, on energy efficiency and quality aspects, introducing also the new labelling scheme. Activities will include:
  - a. An analysis of existing barriers to the uptake of e-cooking in Bangladesh will inform the development of appropriate communication messages and means. The analysis builds on available research findings (e.g. from MECS) and on a small own action research component on aspects such as consumers' product preferences, willingness to pay, and product availability.
  - b. Planning and implementation of a geographically focused awareness and behavioural change campaign. This campaign complements SREDA's planned national campaign on the new standard & labelling scheme, but will on e-cooking appliances only. The target groups are households of the areas selected for the RBF scheme. Possible implementing partners: SNV and/or PA with advisory from MECS.

## ICS component

The support for BBF is a continuation of EnDev's support to the ICS sector in Bangladesh. Being a spin-off from EnDev Bangladesh, the organisation has become one of the major players in the ICS sector. Its organisational capacities have improved over the years since its establishment in 2015. The organisation currently works with over 6,000 microenterprises as partners and manages over 500 field staff in over 200 offices located throughout the country from its main office in Dhaka. BBF has successfully completed two joint projects funded by

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<sup>4</sup> See <https://www.cleancookingalliance.org/cooking-industry-catalyst/venture-catalyst/index.html>.

the GoB and EnDev. BBF has developed capacities of its staff to carry out daily activities in managing diverse challenges of project activities and as a result, has been successful in receiving contract for Korean carbon offset project in 2018. Prior to start of COVID-19 pandemic, BBF was installing over 100,000 ICS per month, which dropped to around 25,000 ICS per month during the initial stages of the pandemic when strict countrywide lockdown was enforced by the government.

The BBF stoves have a robust technical design that gets continuously improved and poses cost-effective alternative to traditional cookstoves for low-income rural households. The women-centred Bondhu Chula Doctor programme is aiming at making a substantive contribution to the economic well-being of women-led households and ensuring that the positive impacts of BBF's ICS can be reaped for their full 5-year lifetime.

The COVID-19 travel restrictions for staff and income losses at the household level limit the current uptake of BBF's stoves, especially in the commercial sector in which many restaurants and tea-stalls face economic constraints. Thus, BBF's implementation speed was hampered, and it needs further external support to bring its operations back on track and to expand its activities. As EnDev has invested heavily in BBF in the last years, it will continue to support BBF to overcome its short-term difficulties. The acquisition of a carbon financing for household ICS was a successful step of BBF towards financial independence. Activities of this intervention include:

- a. support for the Bondhu Chula Doctor programme to train additional 1,500 women. This activity contributes to BBF's effort to increase the lifetime of installed stoves and to provide an additional income generation opportunity to rural women;
- b. support for the marketisation of commercial ICS for restaurants, tea-stalls, hostels, and other thermal PUE applications (yet to be defined, potential exists in bakeries, rice parboiling MSME). Approximately 100 sanitary shops will be advised on how to introduce and improve their technical production processes for large-sized ICS that need to be tailor-made for commercial customers; they will receive a subsidy to lower the retail price; and they will be supported in their marketing activities to expand their customer base.

EnDev will give a small-scale support to SREDA to bridge a financing gap for its staff in the Household Energy Platform (HEP) in 2021. Over the full project period, the EnDev team will support SREDA in its coordinating efforts related to ICS sector. Special emphasis will be given to the regulatory framework for the emerging e-cooking appliance market and an efficient BBF and IDCOL coordination. However, it is not foreseen to continue supporting the sector in the establishment of national testing facilities for the application of the new ISO 19867-Part 1:2018 standard. IDCOL is advanced in the process of getting the Bangladesh University of Engineering and Technology (BUET) accredited as an ISO testing facility for evaluating cookstove performance. In parallel, SREDA started its dialogue with BSTI on setting up respective testing facilities. Although EnDev support would be appreciated by IDCOL and SREDA alike, and a CLASP report of December 2018 has outlined the respective roadmap, the limited budget of EnDev Bangladesh calls for a prioritisation of interventions. As demand for ISO testing services of stoves in Bangladesh is limited (IDCOL, BBF, and about 5 other ICS companies), the need to support several testing facilities in the country seems no longer to be top priority.

## Battery charging component

The EnDev intervention aims to demonstrate business cases for solar battery charging of e-rickshaws either as stand-alone or grid connected net metering systems. EnDev will collaborate with SREDA and REEEP II (solar roof net-metering programme), EEGIRE (technical standards for battery charging and battery recycling) and the planned transformative mobility DKTI project (overall e-mobility strategies and regulatory framework for the transport sector). The following activities are proposed:

- (1) Analyse the competitive advantages of stand-alone solar battery charging stations and grid connected (net metering) solar battery charging stations compared to the established grid-based battery charging. Consideration of past and ongoing pilot projects by SREDA, IDCOL, and utilities.
  - a. Technical feasibility: solar grid net metering charging compared with direct solar charging (no intermediate storage); testing of different battery types (lead-acid and Li-Ion).
  - b. Institutional arrangements and business model: direct charging compared with battery swapping.
  - c. Financial viability: Cost of investment and operation; charging fee structure.
- (2) Develop and demonstrate two business cases for private sector investors and operators: one for a solar grid connected and one for an off-grid solar battery charging station.
  - a. Implement two battery charging demonstration projects as public private partnership with e-rickshaw operators.
  - b. Long-term monitoring of the operation analysing system reliability, maintenance and replacement costs as well as economic rentability of the investment.
- (3) Target relevant stakeholders, such as e-rickshaw operators, utilities, local government, as well as local financial institutions with awareness and training activities to facilitate replication and scale-up.

The intervention will focus on a peri-urban and/or rural area with relevant e-rickshaw business and a reasonable stable power supply (advanced state of implementation of BREB's ongoing overhaul and improvement of the distribution network). Once the business has been demonstrated, relevant stakeholders, such as e-rickshaw operators, BREB, local government, as well as local financial institutions, would be targeted with awareness and training activities to facilitate replication and scale-up.

## 1.1.6 Results

Project results	Targets	Other target dimensions/indicators
People: Access to Electricity	-	-
People: Access to Cooking	230,000 additional people	2 voluntary EE standards and label for e-cooking appliances have been approved by SREDA. Pilot experience is analysed for replication.
SI: Access to Electricity	-	-
SI: Access to Cooking	-	-
PU: Access to Electricity	32 additional (M)SMEs <sup>5</sup>	Solar battery charging business case demonstrated for replication.
PU: Access to Cooking	6,600 additional (M)SMEs <sup>6</sup>	1,500 jobs as Bondhu Chula Doctors are created, thereof 100 % for women.

### E-cooking component

SREDA will be supported to kick-start the S&L scheme with the quick development of EE and quality standards for selected EE e-cooking appliances. EnDev will strengthen the planned national awareness campaign in a selected target region focussing on EE e-cooking appliances. For the same target region an RBF programme will support the commercial sale of 20,000 EE e-cooking appliances. For conservative estimation of stove stacking practice, only 50 % of a household (2.15 people) is considered as reached by an e-cooking appliance, resulting in 43,000 people, which makes by 12/2023 **additional 27.000 people** (adjusted). The verification system of the RBF will trace stove stacking practices of customers to calculate real outcome figures.

**Job creation:** The provision of incentives for e-cooking appliances sold to rural customers will increase companies' investments into rural retailing structures, thereby leading to rural job creation and income generation.

**Impacts:** the intervention on e-cooking will improve the user experience and appreciation of e-cooking, leading in turn to higher demand and uptake of e-cooking appliances. Increased usage of e-cooking appliances (most likely in stacking arrangements with ICS/LPG) will contribute to health benefits and livelihood improvements due to saved time needed for cooking. Taking into account the relatively low electricity price in Bangladesh<sup>7</sup>, the shift to e-cooking should also have economic benefits (but detailed cost comparison is to be conducted). In addition, the increased up-take of energy efficient appliances will – compared to the BAU – decrease energy consumption and thereby reduce GHG emissions emitted from Bangladesh's fossil-fuel based power generation.

**Replication:** The experience gained with standard setting, RBF and the awareness campaign for e-cooking will be analysed, evaluated and shared with interested parties within and beyond EnDev. This intervention can potentially contribute to EnDev's new output indicator 4.1 ("Experience from 10 pilot projects on the use of innovative cooking technologies have been analysed for replication").

<sup>5</sup> 2 charging station operator and 30 rickshaw drivers.

<sup>6</sup> tea stalls, restaurants etc.

<sup>7</sup> The current life line tariff for rural households is at only 3.7 EUR Cent per kWh for the first 50 kWh per month.

## ICS component

**Household access to ICS:** BBF has committed itself to install 6 million ICS between 2018 and 2023 under its carbon project. Up to December 2020, about 1.5 million units were installed, leaving 4.5 million units to be installed until 12/2023. Nonetheless since the implementation in 2020 fell short of expectations due to COVID-19 related reasons (roughly 50 % less) and the development especially in 2021 is uncertain, only 75 % of the ambitious BBF target is therefore considered for the EnDev forecast. Under the current contract, BBF receives advance payments of \$10 per stove from the carbon funding. Considering EnDev's cumulative budget support and further technical assistance of BBF since 2015 in relation to future carbon revenues, EnDev will be able to claim as spin-off share of stoves of 25 % for the years 2021, 2022, and 2023. Applying the sustainability factors etc. of EnDev's monitoring system (adjusting), this means **additional 203.000 people**.

**SME access to ICS and ICS production support:** With exclusive support from EnDev, BBF will in addition install 15,000 larger commercial stoves in (M)SMEs (mainly local restaurants, tea stalls, and hostels), which makes **6,600 additional (M)SMEs** after applying the sustainability factors etc. of the EnDev monitoring system. Most of these are small, with total staff numbers in the 1 to 5 range. As the ICS are used in rural areas, almost all (M)SMEs are headed by men; approximately 10 % of employees are female. Changes in the quality and quantity of products are unlikely, but cost savings from improved fuel efficiency are likely to be re-invested into the business, however with marginal effects on additional employment.

While the impact in terms of numbers achieved will be limited during the program phase, this will help to formalise the market for larger, higher capacity ICS for (M)SMEs, contributing to sustained sales of commercial stoves.

**Job creation:** EnDev's support to BBF for its Bondhu Chula Doctors Programme will create **additional 1,500 jobs for women**. The support to BBF's commercial cookstove marketing aims at 500 commercial stoves/months which will strengthen the business case for existing stove manufacturers and may even invite additional sanitary shops to become stove manufacturers.

**Impacts:** The support to BBF interventions will result in carbon emissions reductions (CERs) which will be measured and validated using UNFCCC methodologies. The possible carbon savings for larger commercial stoves are estimated 27 times higher as a typical household stove and pay back periods based on savings of wood fuels are less than six months. In the future, commercial ICS could also become part of the carbon program and ensure longer term sustainability. The GHG emissions saved by this intervention will also contribute to the GoB's target of reducing their GHG emissions by 15 % by 2030 (Intended Nationally Determined Contribution to UNFCCC of 2015).

The BBF program also has a significant impact on health through the reduction of indoor air pollution. As pointed out in a statistical survey carried out by Bangladesh Institute of Development Studies (BIDS) on behalf of the Ministry of Environment and Forestry, family health expenditures related to respiratory problems reduced significantly (> 80 %) in families who



switched to the Bondhu Chula stove as the chimney evacuates much of the smoke from the cooking area.

### Battery charging component

EnDev aims at demonstrating technically feasible and financially viable business cases for solar charging of e-vehicles with a focus on peri-urban and possibly rural areas.

**Job creation:** The conversion to e-rickshaws reduces the drudgery for pedal rickshaw drivers. Reduction of charging and battery replacement costs benefits both rickshaw operators and rickshaw drivers. The direct impact of this kind of business case demonstration is **limited (2 SMEs, 30 MSMEs)** but has a **huge scaling up potential**.

**Impacts:** The anticipated benefits of the demonstrated solar business cases are an increased charging reliability and battery life while ensuring favourable long-term charging costs. In combination, these benefits improve the commercial viability for the operator, while the benefits for the utility are reduced power demand (replacement of the predominantly fossil-based electricity with PV generation) and grid disturbance (enforcement of EEGIRE's battery charging guidelines). Increased battery life also reduces battery waste and related environmental impacts.

**Replication:** The overall objective of this research and demonstration intervention on battery charging for e-rickshaws is replication. The experience gained with will be analysed, improved were possible, and stakeholders in Bangladesh and globally will be supported in their replication efforts. This intervention can potentially contribute to EnDev's new output indicator 4.2 ("10 innovative concepts for the productive use of energy in selected value chains were replicated three times each").

## 1.1.7 Sustainability

### Clean cooking sector

**EnDev's e-cooking component** aims for market transformation. The business-as-usual scenario is having a market that is mainly catering to urban customers and that sells many non-branded, often low-quality products. Instead, the EnDev interventions aims at a market in which suppliers make high quality products available, also to rural customers. EnDev supports SREDA and BSTI to developing Bangladesh standards, testing procedures and labelling scheme for energy efficient and low wattage e-cooking appliances. In parallel, EnDev will start with a geographically focussed intervention for their RBF and awareness and consumer education campaign. Contingent on additional funding, this may be expanded to a broader area or the national level. While the regulatory environment will prevail and sets the corridor for the private sector to take action, the incentive scheme is a temporary tool to strengthen the supply side on quality aspects and rural outreach; the awareness campaign is a temporary tool to strengthen demand. Once the S&L scheme has been recognised and accepted by suppliers and customers and SREDA and BSTI gained experience to improve and enforce mandatory standards for electrical appliances, support by developing partners is no longer necessary.



**EnDev's ICS component** ensures that BBF's results accomplished before COVID-19 are safeguarded, that its progress in results delivery (training of 1,500 female Bondhu Chula doctors; marketing of 15,000 commercial stoves) can be sustained, and its operations are kept financially sustainable. The foreseen withdrawal of EnDev at December 2020 is postponed until end of 2023.

## Electricity sector

The business-as-usual scenario is a rapid growth of grid-based battery charging. However, **solar battery charging for e-rickshaws** has a significant scaling potential, as the current market of about 1.8 million e-rickshaws is quickly expanding also in rural areas. The often-improvised charging set-up without stable grid power supply and proper charge controllers is greatly reducing battery lifetime and therefore the profitability of the business case.

Existing barriers are mainly the lacking awareness of and access to information of all key stakeholders (rural (M)SMEs, local financial institutions, local government, and the sub-branches of the utility BREB) on technical system optimisation and financial rentability of the required investment. Once the technical feasibility and financial viability has been demonstrated and awareness of key stakeholders is improved, stakeholders can fully benefit from national programme activities and resulting opportunities such as the GIZ Sustainable Mobility programme (DKTI). Close collaboration with SREDA will facilitate the replication of activities to other rural target regions once additional funding gets available.

### 1.1.8 Gender Strategy and Safeguards

The gender strategy of EnDev Bangladesh aims at strengthening gender equality in its implementation activities, within its partner organisations and its team – please see separate document Gender Analysis for details (word-file: *210226-EnDev BD Programming 2021 Gender Analysis.docx*).

**At the implementation level**, the following measures are foreseen:

- **For e-cooking promotion**, EnDev aims at designing an awareness and consumer education campaign that targets male and female household member alike. In the behavioural change campaigns women will be engaged as change agents and community leaders to promote clean cooking solutions among their neighbours and peers. If there arises the need for new or improved appliance design, women representatives must also be consulted during the design phase to ensure practicality and user friendliness of the clean cooking solutions.

The annual volume of e-waste in Bangladesh is estimated to increase from 400,000 tonnes in 2018 to 4.6 Million tonnes by 2035. Since 2012, the Department of Environment has been working on a policy on e-waste. Several drafts have been published, the latest in 2017 and 2019, incorporating feedback from industry and WTO. It is planned to introduce an extended producer/manufacturer responsibility (EPR) scheme, gradually increasing coverage from 10 to 50 % of e-waste amount over the first 5 years after adoption. Rules will apply to all household appliances including e-cooking appliances. EnDev will address proper disposal of appliances in its awareness campaign and include, once e-waste management rules are formally adopted, compliance into its eligibility criteria for participation in the RBF.



- **For ICS maintenance**, the project aims for transformative change in terms of gender equality with its support to the Bondhu Chula Programme. The baseline situation prior to the BBF intervention was that the ones installing ICS at rural households were men. Maintenance services were not available. The BBF programme now targets primarily women in order to train them as ICS installers and maintenance staff. For their services they can charge a fee from ICS users that will increase their monthly income. Due to EnDev's support to BBF's Bondhu Chula Doctor programme, an additional 1,500 women will have the opportunity to improve their livelihood. As this transformative change also brings the risk of unintended negative impacts (weak labour rights in informal sector; personal insecurity and sexual harassment on the workplace), the project emphasises the need to address these issues and outline possible coping strategies in the trainings to Bondhu Chula Doctors.
- **For solar battery charging**, leading lead acid battery manufacturers in Bangladesh have built a national recycling scheme which offers price reductions if obsolete batteries are returned to the retailer. While not all suppliers have yet established such systems, EnDev will ensure that only properly managed battery brands are supported by its activities. The topic of proper battery recycling will also be included in all awareness activities and materials.  
The current e-rickshaw growth is based on the use of cheap and locally available lead-acid batteries. EnDev will consider the advantages and disadvantages of a quick shift to Li-ion batteries. While Li-ion batteries have a longer lifetime and are less harmful to the environment, they are also more expensive and there is currently no national policy or recycling capacity in place for Li-ion batteries which increases the risk of not adequately treated electrical waste.

EnDev's main **partner organisations** SREDA and BBF have not yet reached gender equality in their workforce. Gender expertise in general is low and both organizations are just starting to embed the topic of gender in their organizational policies and structures. EnDev currently supports BBF in undertaking a gender analysis and will further support BBF in learning from the results and coming up with adequate gender equality policies for their own staff as well as for their projects. These, among others, should include nominating a gender focal point for as well as trainings for their staff on gender equality and gender mainstreaming.

Although the **staff of EnDev Bangladesh** is all male (currently 4 team members), the team is well trained on gender-related aspects, possess a good gender expertise and has a dedicated gender focal person. Women will be explicitly encouraged to apply for future open positions. Team members are encouraged to set their personal goal on promoting gender equality, and training of EnDev staff will continue to enhance their gender knowledge and experience.

# 1.2 Benin

## 1.2.1 Summary and key data

Promoted technologies	 		
Summary of proposed interventions(s)	<p>Training, business development, hardware</p> <ul style="list-style-type: none"> <li>• BDS with focus on entrepreneurial skills and women</li> <li>• Awareness-raising on quality issues and opportunities for PU</li> <li>• Organisational skills for professional associations</li> </ul> <p>Access to finance</p> <ul style="list-style-type: none"> <li>• Explore and test financial instruments</li> <li>• Elaborate business plans for female entrepreneurs on PUE</li> <li>• Carbon credits for ICS</li> </ul> <p>Evidence, learning transfer and innovation</p> <ul style="list-style-type: none"> <li>• Technology transfer for PUE</li> <li>• Market intelligence</li> <li>• Promotion of e-cooking</li> <li>• Pilot experiences on e-waste management</li> </ul> <p>Policy advice and capacity development</p> <ul style="list-style-type: none"> <li>• Advocacy for tax exemption</li> <li>• Definition of national standards for ICS</li> <li>• Development of a national plan for e-waste management</li> <li>• Quality assurance and certification</li> </ul> <p>Partnerships and alliances</p> <ul style="list-style-type: none"> <li>• Advocacy for gender equality</li> <li>• Electrification and ICS for remote rural areas</li> <li>• Consumer awareness and behaviour change</li> <li>• Foster solar technology transfer for applications in agriculture</li> <li>• Organisation of sector stakeholder meetings</li> </ul>		
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	49,074	People	<i>vulnerable groups, rural electrification</i>
Cooking / thermal energy for households	289,726	People	<i>e-cooking, higher tiers, vulnerable groups</i>
Electricity and/or cooking / thermal energy for social infrastructure	750	SI	<i>higher tiers, vulnerable groups</i>
Energy for productive use / income generation	1.002	MSMEs	<i>higher tiers, female entrepreneurship</i>
Project period	01.01.2021 – 31.12.2024	Indicative Budget	<b>6.106.950 €</b>

## **Summary of proposed interventions**

Both components - Promote PUE with focus on female entrepreneurs in the agriculture sector; Explore and test innovative financial instruments; Advocate for gender equality. Cooking Component - Interventions will cover its priority topics: more professionalisation, larger production capacity and wider distribution networks. Flagship interventions: Support 15 priority cooperatives in becoming professional ICS producers and distributors; Integrate into the ICS sector companies already consolidated in connected sectors; Support the national ICS professional association to develop its organisational capacities; Assist the government in the provision of ICS for vulnerable population; Provide advice to the government for the definition of national standards for ICS. (and whenever additional budget is available: Implement RBF for the promotion of higher tier stoves and wider distribution networks) Solar Component - Interventions will cover its priority topics: quality assurance, minimisation of environmental impact and wider coverage of rural areas. Flagship interventions: Develop entrepreneurial skills of national solar companies; Sensitise companies and clients on the benefits of using quality equipment; Promote private sector participation in the management of e-waste generated by off-grid solar equipment; Assist the government in the definition of a national plan for e-waste management; Provide advice to the government in regulatory issues such as quality certification and tax exemption. (and whenever additional budget is available: Implement RBF to facilitate the access to solar energy by the poor in rural areas)

## **Outcome and impact**

EnDev Benin aim to have a positive impact among population of rural (and peri-urban) areas. Our priority is to foster the improvement of living conditions (SDG1, SDG3, SDG4) as well as the creation and consolidation of economic activities (SDG8). We also will prioritise our contribution to gender equity (SDG5) and to minimise negative impacts on the environment (SDG13). Our estimated beneficiaries are:

338,800 people ; 750 SI ; 1.002 PU

## **Project period and requested indicative budget**

6.106.950 € for the period 01.01.2021-31.12.2024

## **Project partners**

- Ministry of Energy (ME), General Directorate of Energy Ressources of the ME (DGRE), Gender and Development Unit of the ME (CGeD), Beninese Agency for Rural Electrification and Energy Efficiency (ABERME)
- Private producers and distributors of ICS which are members of the professional association of ICS stakeholders (UNACooPFA)
- Private importers and distributors of off-grid solar equipment, some of which are members of the professional association of RE specialists (AISER)

## 1.2.2 Theory of change (ToC) and state of market

### ICS market

The ICS market is still at the pioneering stage and is concentrated in the urban areas of some of the most populated municipalities. The access rate to clean cooking technologies is about 8% for urban areas and 5% for rural areas (WB, 2020)<sup>8</sup>. The potential demand is high, especially in urban and peri-urban areas, where access to firewood is increasingly expensive.

Biomass-fuelled ICS dominate the market and more than 85% of the offer is made up of improved cookstoves of the "anfani" brand of the production units supported by EnDev. Among these production units, the 15 better ones have a serious potential to evolve from efficient small-scale to semi-industrial management and production structures. Consolidated companies in connected sectors such as brick manufacturing and metal works are having initial contacts with the ICS sector, with a particular interest in larger and higher tier stoves, mainly for PU and SI applications.

The DGRE wishes to dynamise the ICS market with the development of the National Action Plan for Clean Cooking, the set-up of the National Committee for Clean Cooking and the definition of national standards for ICS. The National Solidary Aid Fund (FASN) of the Ministry of Social Affairs and Micro Finance (MASMF) plans to introduce the distribution of ICS for the most vulnerable population. The UN World Food Programme (WFP) fosters the deployment of ICS to serve school canteens around the country. The EU Delegation (EUD) is highly interested in the application of ICS for PU in agriculture and the promotion of high-tier ICS (e.g. e-cooking). EnDev is currently carrying out an analysis of the potential for e-cooking in Benin (see section 5, Modalities, for details).

### Theory of Change - ICS market - EnDev Benin

	<b>Energising Lives - Social development</b>	<b>Energising Opportunities - Economic development</b>	<b>Energising Climate - Combating climate change</b>
<b>Impacts</b>	<ul style="list-style-type: none"> <li>Improved gender equality</li> <li>Improved HH income</li> <li>Reduced vulnerability</li> <li>Improved health (HH, SI)</li> <li>Better learning environment</li> </ul>	<ul style="list-style-type: none"> <li>Strengthened rural economic activity</li> <li>Increased SME productivity</li> <li>Increased job creation</li> <li>Increased resource mobilisation</li> </ul>	<ul style="list-style-type: none"> <li>Reduced GHG emissions</li> <li>Reduced forest degradation</li> <li>Strengthened climate change resilience of beneficiaries</li> </ul>

<sup>8</sup> IEA, IRENA, UNSD, World Bank, WHO. 2020. Tracking SDG 7: The Energy Progress Report. World Bank, Washington DC. © World Bank. License: Creative Commons Attribution—Non Commercial 3.0 IGO (CC BY-NC 3.0 IGO).

<b>Assumptions</b>	<ul style="list-style-type: none"> <li>• The economic growth of Benin continues over time</li> <li>• Environmental and gender aspects remain a priority for the government and its partner cooperation institutions</li> <li>• The national gas network only covers a small part of the national territory</li> </ul>
<b>Outcome (details in section 'Results')</b>	<ul style="list-style-type: none"> <li>• Normalised presence of woman in the ICS sector at all levels</li> <li>• Professional and strong companies in a sustainable market of ICS products and services</li> <li>• Improved regulatory and policy framework for the development of ICS products and services</li> <li>• Increased production, distribution and sales of quality ICSs</li> <li>• Increased number of PU and SI projects based on ICS</li> <li>• Available capacity to support entrepreneurs in the development of business plans for ICS businesses and PU projects</li> <li>• Financing institutions with better understanding of the dynamics of the ICS market and willing to participate in it</li> <li>• Reduced environmental impact</li> </ul>
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>• Companies invest in ICS products and services</li> <li>• ICS companies are interested in diversifying their financing sources and business portfolio</li> <li>• Demand of quality ICSs for HHs, PU and SI</li> <li>• The government is interested in improving the framework conditions</li> </ul>
<b>Outputs and results</b>	<ul style="list-style-type: none"> <li>• Stove producers have stronger and more professional structures, skills to produce higher tier ICS, and larger production capacity</li> <li>• Stove distributors have stronger and more professional structures, larger distribution networks and improved entrepreneurial skills</li> <li>• Consumers are aware of the advantages of using quality and higher tier ICS</li> <li>• Entrepreneurs are aware of possibilities offered by PUE applications, and business plans are available. A larger percentage of PUE project managers are women</li> <li>• More women have high responsibilities in the ICS sector</li> <li>• Alternative financing instruments have been tested</li> <li>• Market analyses have been carried out and shared with stakeholders in the sector</li> <li>• Concrete proposals for the improvement of framework conditions for the ICS sector have been submitted to the government</li> <li>• Collaborations with CLASP, Dutch cooperation, EUD, FASN, LEMA, WB/PASE and WFP are set up</li> </ul>

<b>Key interventions</b>	<p>Training, business development, hardware Business development support (BDS), with focus on entrepreneurial skills and women Manufacturing of ICS for PU and SI Equipment and TA for innovation Organisational skills (UNACooPFA)</p> <p>Access to finance Results-based financing (RBF). Targets: larger distribution networks and higher-tier stoves Bankability of ICS businesses Linking SFDs and support for the development of specific financial services Carbon credits for ICS (GERES) Business plans for PUE, with focus on female entrepreneurs</p> <p>Policy advice and capacity development Strategic advice to DGRE for the definition of national standards for ICS (WB/PASE) Support to the DGRE for the development of a national plan for clean cooking Advocacy for tax exemption of e-cooking</p>	<p>Evidence, learning transfer and innovation Market intelligence: analysis based on our M&amp;E system to support market stakeholders in forecast and strategy High-tier ICS, e.g. PUE, e-cooking (CLASP) Testing, quality control and “anfani” certification (ANM) Transfer of capacities to communes and intercommunal structures (GIC, etc.)</p> <p>Partnerships and alliances Advocacy for gender equality (CGeD) Availability of ICS to vulnerable population Promotion of high-tier ICS, PU applications and gender equality, mainly in agriculture (EUD and Dutch cooperation) Development of capacities for LEMA (WB/PASE) Development of the market for alternative fuels (EU/RECASEB, GERES, GERME) Consumer awareness and behaviour change (UNACooPFA) Organisation of sector stakeholder meetings in a regular basis</p>
	<p><b>Supply side barriers</b></p> <p>Weak entrepreneurial skills and competences</p> <p>Limited ICS production capacity</p> <p>Low level of innovation towards PU&amp;SI and higher-tier ICSs</p> <p>Limited business practices for financial management</p> <p>Limited capacity to mobilise investment</p> <p>Insufficient distribution networks</p>	<p><b>Demand side barriers</b></p> <p>Low average purchasing power</p> <p>Lack of consumer finance</p> <p>Low awareness of the disadvantages/risks of traditional cooking systems</p> <p>Low average purchasing power for the acquisition of new ICS products and services, mainly for the most innovative and expensive ones</p> <p>Untapped potential for the promotion of PUE applications</p>
<b>Assumptions</b>	<p>Limited access to modern cooking equipment means that a large untapped potential market for ICS exist. However, current limited human capacities (lack of professionalism) do not allow the increase of the production capacity, the expansion of distribution networks, and the development of bankable proposals for the consolidation of the ICS market.</p>	



<b>Root cause</b>	The growth of the market for cooking equipment, even publicly supported, is slow, and geographically and technologically limited.
<b>Core problem</b>	Limited access to modern cooking equipment remains a major limitation for social and economic development and contributes to greenhouse gas emissions in Benin.

## Off-grid solar market

The rural electrification rate is still of only 6,5% in Benin. In the National Electrification Strategy (SNE) it is envisaged that 15% of localities will not be covered by neither national grid nor mini-grids. Besides, many localities of those for which grid electrification has been planned, currently observed how the constant delays in electrification programmes move away their electrification expectations. Therefore, unmet demand remains high in rural, but also, in peri-urban areas.

Between 2018 and 2020, eight companies were able to have a regular presence in the formal off-grid solar market in Benin, although about 30 exist. Most of the companies are SMEs, but the market is dominated by four companies, three out of which are multinationals. Sales of off-grid PV equipment is growing. For example, sales of certified systems grew by more than 5% in 2020; however, they were commercialised by the four major companies only. In addition to the formal market, evidences show that an important informal market, dominated by non-certified products, exist.

The commercialised systems range from pico-solar lamps (tier 1) to customised systems typically of up to 600 Wp (tier 2). Used payment modalities are: payment up front, payment in instalment and PAYGo. The latest is the most common one and covers about 90% of the sales.

Several initiatives financed by the government and donors have supported the multiplication of grid-connected and off-grid solar systems installed and sold in Benin in recent years. This generates a problem related to the management of e-waste because the country does not possess the necessary capacities to deal with. The DGRE has expressed its will to provide the country with a national plan for e-waste management. Market analyses show transactions concentrate in peri-urban areas and rural areas close to main roads. Because of this, the Beninese Agency for Rural Electrification and Energy Efficiency (ABERME) would like to have a project that exclusively addresses the most vulnerable population in rural areas. The EUD is highly interested in supporting off-grid rural electrification and e-waste management initiatives, as well as PUE projects in Benin. Discussions between EUD and EnDev are ongoing, co-financing modalities will be explored.

## Theory of Change - Off-grid solar market - EnDev Benin

	<b>Energising Lives - Social development</b>	<b>Energising Opportunities - Economic development</b>	<b>Energising Climate - Combating climate change</b>
<b>Impacts</b>	<ul style="list-style-type: none"> <li>Improved gender equality</li> <li>Improved HH income</li> <li>Reduced vulnerability</li> <li>Improved health (HH, SI)</li> <li>Better learning environment</li> </ul>	<ul style="list-style-type: none"> <li>Strengthened rural economic activity (solar retailers, PUE)</li> <li>Increased SME productivity</li> <li>Increased job creation</li> <li>Increased resource mobilisation</li> </ul>	<ul style="list-style-type: none"> <li>Reduced GHG emissions</li> <li>Reduced negative impact of solar e-waste</li> <li>Strengthened climate change resilience of beneficiaries</li> </ul>
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>The solar market continues its development at the global level, with steady reduction of costs</li> <li>The economic growth of Benin continues over time</li> <li>Environmental and gender aspects remain a priority for the government and its partner cooperation institutions</li> <li>The national power network will not cover the total national territory</li> </ul>		
<b>Outcome (details in section 'Results')</b>	<ul style="list-style-type: none"> <li>Normalised presence of woman in the off-grid solar sector at all levels</li> <li>Strong companies in a sustainable market of solar products and services</li> <li>Improved regulatory and policy framework for quality products and services</li> <li>Minimised informal market of non-certified products</li> <li>The government has approved a national plan for e-waste management</li> <li>Increased sales of quality products in rural and peri-urban areas</li> <li>Increased number of PUE and SI projects</li> <li>Available capacity to support entrepreneurs in the development of business plans for solar businesses and PUE projects</li> <li>Financing institutions with better understanding of the dynamics of the off-grid solar market and willing to participate in it</li> <li>Reduced environmental impact</li> </ul>		
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Companies invest in off-grid solar products and services</li> <li>Solar companies are interested in diversifying their financing sources and business portfolio</li> <li>Demand of quality solar products for HHs, PUE and SI</li> <li>The government is interested in improving the framework conditions</li> </ul>		
<b>Outputs and results</b>	<ul style="list-style-type: none"> <li>Solar companies are stronger and have improved entrepreneurial skills and solid knowledge of advantages of the use of quality assurance criteria</li> <li>Consumers are aware of the advantages of using quality solar products</li> <li>Entrepreneurs are aware of possibilities offered by PUE, and business plans are available</li> <li>More women own and manage solar businesses and PUE projects</li> <li>Alternative financing instruments have been tested</li> <li>Market analyses have been carried out and shared with stakeholders in the sector</li> <li>Results of e-waste pilot experiences are available and assessed based on which a national plan for e-waste management is proposed</li> <li>Concrete proposals for the improvement of framework conditions for the off-grid solar sector have been submitted to the government</li> <li>Collaborations with ABERME, CLASP, Dutch cooperation, EUD and INRAB are set up</li> </ul>		

<b>Key interventions</b>	<p>Training, business development, hardware BDS with focus on entrepreneurial skills (marketing, post sales, etc.) and women Quality assurance Awareness-raising on quality issues and opportunities for PU</p>	<p>Evidence, learning transfer and innovation Market intelligence: analysis based on our M&amp;E system to support market stakeholders in forecast and strategy Technologies for PUE, mainly in the agriculture sector (CLASP, INRAB) Pilot experiences on e-waste management: infrastructure, private participation, commercial models, training, sensitisation, etc. (CLASP)</p>
	<p>Access to finance RBF. Targets: poor HHS, PUE, e-waste Explore and test financial instruments for solar companies in collaboration with financing institutions Development of business plans for PUE, with focus on female entrepreneurs</p>	<p>Partnerships and alliances Advocacy for gender equality (CGeD) Electrification of remote rural areas, including consumer awareness and behaviour change (ABERME) Promotion of PU applications and gender equality (EUD and Dutch cooperation) Foster solar technology transfer for applications in agriculture (INRAB) Organisation of sector stakeholder meetings in a regular basis</p>
	<p>Policy advice and capacity development Policy and regulatory advice (quality certification, tax exemption, e-waste, national/international partnerships, equipment efficiency, etc.) Development of a national plan for e-waste management (DGRE) Capacity building for the application of quality certification</p>	

	<b>Supply side barriers</b>	<b>Demand side barriers</b>	<b>Enabling environment barriers</b>
<b>Barriers</b>	Weak financing capacity to implement payment strategies adapted to the needs of the clients (e.g. PAYGO business model)	Low average purchasing power	No clear regulations quality and certification of solar products and companies is in place.
	Limited access to finance (low awareness of available opportunities, low capacity to develop bankable business plans, low ability to negotiate bank loans, etc.)	Distance and difficult accessibility of rural localities for solar companies	Lack of a tax exemption mechanism that covers all imported off-grid solar products
	Limited entrepreneurial skills (weak marketing and after sales strategies, low capacity to develop long-term strategies, low ability to negotiate with suppliers, poor knowledge of overseas trade, etc.)	Low awareness of risks of traditional energy use	Lack of policies and regulations as well as infrastructure concerning e-waste treatment
	Limited offer of PUE products	Low awareness of productive uses with solar energy	Commercial finance institutions are reluctant to work in the solar off-grid market because of lack of experience in it and lack of proven successful business models to be replicated
	Low appreciation of quality and warranty aspects	Scarce opportunities for loans to be returned at medium and long term. Significant limitation for PUE applications that require high investment and long payback periods.	Lack of policies and regulations to facilitate partnerships between local and international companies
	Partnerships with local companies are not attractive for multinationals		Weak professional association to coordinate and advocate for sector priorities

<b>Assumptions</b>	Limited access to electricity means that a large untapped potential market for off-grid solar equipment exists. However, current limited entrepreneurial capacities as well as the lack of appropriate incentives, do not allow formal off-grid solar companies to expand their businesses into rural (and peri-urban) areas, where low quality of products and services of the informal activities is having a negative impact. In addition to this, if no e-waste management strategy is soon put in place, there is the risk for the off-grid solar PV technology to be perceived as an additional problem rather than a solution in Benin.
<b>Root cause</b>	The growth of the market for off-grid solar products is slow and geographically limited.
<b>Core problem</b>	Limited access to electricity in rural and peri-urban areas, which perpetuates dependence on conventional and traditional energy resources. The consequence is low social and economic development combined with high negative impact on the environment.

## 1.2.3 Transformative character

### Cooking Component

#### Market development

The project aims to further strengthen professionalisation and increase production as well as distribution capacity. The market is currently dominated by artisanal production units with an average capacity of < 100 ICS/month. It is expected to shift into a consolidated production tissue of units with an average production capacity > 1.000 ICS/month based on specialised division of work and use of machinery. A market with larger production and distribution capacity will be able to serve a wider percentage of the population, either households, businesses or social institutions. Since the project will also work on innovation and higher-tier stoves (including e-cooking, which potential is currently under study), the market will better meet the needs of each type of client. Manufacturers and distributors will shift from small to medium size and will have better qualified employees, which means more long-term sustainable structures.

#### Economic development

The project will foster SME productivity and job creation, not only by supporting stove manufacturers and distributors, but also by promoting PUE for the value chains, mainly, in agriculture (rural economic development). Besides, the project will contribute to resource mobilisation by exploring and testing alternative financing mechanisms.

#### Social development

As a consequence of its support to economic development, the project will also be contributing to the improvement of HH income situations. In addition to this, priority attention will be given to female entrepreneurs and job creation for women (e.g. in agriculture value chains, where women are key players in mane processing activities). Air pollution in HH and product processing kitchens will be reduced. Anthropogenic pressure on forest resources will be limited. All this will contribute to better gender equality as an additional impact.

#### Poverty alleviation

The expansion of ICS distribution networks into rural remote areas will reinforce the “leave no one behind” approach. The project will carry out a specific activity to deploy ICS in school canteens, mainly in the poorest areas. The project will also specifically address the

facilitation of access to ICS by vulnerable population. The project will continue until June 2021 the implementation of ongoing covid-19 response activities (remaining budget from the previous implementation period) from which most vulnerable population benefits.

## Solar Component

### Market development

The project aims to focus on three aspects that are not well developed yet in the off-grid solar sector: quality assurance, minimisation of environmental impact and wider coverage of rural areas. The project will contribute to adapt the regulatory framework to foster that companies of the formal market import and commercialise products with quality certificates, and that the informal market, of usually non-certified products, is minimised. The project will support the aim of the government to develop the framework conditions and the appropriate infrastructure to manage e-waste, which do not exist today in the country. The project will facilitate that the solar off-grid technology reaches the rural population of the country, which today does not have access to electricity to cover its basic needs.

### Economic development

Today, only 4% of solar off-grid systems are used for revenue-generating activities. The project will support SME productivity and job creation, by promoting PUE, with a special attention given to value chains in agriculture (rural economic development). The e-waste management activities will also be a new source of SME and job creation. The project will contribute to resource mobilisation by exploring and testing alternative financing mechanisms.

### Social development

A consequence of the project's support to economic development will be the indirect contribution to the improvement of HH income situations. In addition to this, priority attention will be given to female entrepreneurs and job creation for women, which will result in better gender equality. Data collected by the project show that in 65% of cases solar products are used by children to study, which make us confident that we can also make a good contribution to education of children in rural areas.

### Poverty alleviation

The project will specifically address the segment of the population which is not touched by market dynamics ("last mile" concept), not only in rural but also in peri-urban areas. The project will continue until June 2021 the implementation of ongoing covid-19 response activities (remaining budget from the previous implementation period) from which most vulnerable population benefits.

## 1.2.4 Collaboration

## Cooking Component

### Sector alignment

Our planned activities are fully in line with the National Development Plan 2018-2025 (PND), which foresees that the percentage of households using ICS will increase from 17,64% in 2018 to 52,97% in 2025. Besides, they are in line with NDC targets, which estimates that

140.000 households will gain access to ICS between 2021 and 2030. They also align with the National RE Development Policy (PONADER), which highlights the role of innovation for the consolidation of clean cooking technologies for productive use. In 2019, the regional (ECOWAS) policy for the integration of gender in energy access has been transposed into a national action plan. The objective of this document is to ensure that neither women nor men are discriminated in the development of energy projects and any negative impacts for one or another is removed or minimised. Finally, EnDev Benin integrates the 'behaviour change' concept proposed from EnDev Global in its cooking activities.

The main value added of EnDev lies in: it is the only institution that intervenes at the same time in the offer side, in the demand side as well as in the conducive framework side of the ICS market in Benin. This guarantees a holistic and balanced support to all key areas and stakeholders involved in the sustainable development of the ICS market; More than 85% of the ICS country's offer is made up of improved cookstoves of the "anfani" brand, which is the one supported by EnDev; EnDev Benin is the only institution with an approach exclusively based on private sector participation and professionalisation as a main driver for sustainability; It is the cooperation agency with the longest record in the ICS market of Benin; It is also the only one which is looking in detail at innovation aspects for the development of new stove models linked to the development of alternative fuels.

### **Implementer base**

The proven and relevant experience of EnDev Benin is recognised by the rest of the players in the sector. There are ongoing collaborations with them on:

- DGRE: improvement of the policy framework, particularly the development of the National Action Plan for Clean Cooking, the establishment of the inter-ministerial National Committee for Clean Cooking, and the definition of national standards for ICS.
- PASE (WP project): definition of national standards for ICS, capacity building support to the university testing laboratory (LEMA<sup>9</sup>), and homogenisation of market development as well as impact assessment (CES) approaches.
- National agency of standards (ANM): certification of ICS "anfani" and its manufacturers.
- RECASEB (EU project): carrying out of a series of studies on the organisation of the ICS and alternative fuel sectors by anticipating a national alliance for clean cooking.
- WFP: access facilitation to ICS for social institutions, particularly school canteens, whose development is one of the priority areas of the government.
- FASN: access facilitation to ICS for vulnerable populations: poor families, school canteens in poor areas, orphanages, prisons as well as population affected by floods (unfortunately, areas heavily affected by floods are frequent in every rainy season. These areas change from season to season. Floods cause to families and businesses damages that take months to be recovered and, sometimes, total losses).
- Intercommunal Grouping of the Collines Department (GIC): integration of the clean cooking dimension in local strategies. Development of local capacities to design and manage ICS and alternative fuel projects.
- ONG GERME: transformation of agriculture residues into alternative fuels (e.g. briquettes from rice crops residues).

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<sup>9</sup> Laboratory of Energetics and Applied Mechanics at the University of Abomey Calavi



- UNACooPFA: development of capacities of the cooperatives and SMEs that produce and distribute ICS. Organisation of promotional and sensitisation campaigns to use the potential of the 'behaviour change' approach to expand and consolidate the demand.

## Leverage

The project intends to:

- Continue exchanges with the EU Delegation, which has expressed interest in co-financing activities related to applications of PUE in agriculture, innovation towards more efficient ICS and electric cooking, promotion of gender equality, and the "leave no one behind" approach.
- Set up exchanges with the Dutch project NUFFIC, which may be interested in co-financing capacity development support for LEMA.
- Pursue synergies with the GIZ project Promotion of Agriculture Financing (ProFINA) to facilitate decentralised finance services (DFS). Main objective is the development of financial products adapted to the needs of SMEs that produce and use ICS.
- Enter negotiations with the Unit in Charge of the RE Development Policy of the Presidency of the Republic (UC/PDER) for the tax exemption of cooking equipment, particularly electric and solar cookers.
- Pursue exchanges with the consultancy company GERES, which has experience in the area of carbon credits for biomass projects.
- Set up exchanges with the Collaborative Labelling and Appliance Standards Program (CLASP) on e-cooking. In 2020, the Global LEAP Awards launched the inaugural Electric Pressure Cooker (EPC) Competition.

## Nexus

Actors in other sectors with which we will pursue collaboration are:

- Projects financed by the Dutch cooperation (BeniBiz, NUFFIC, EJASA): promote energy applications in the value chain in the agriculture sector. Special focus on women and youth. (ongoing exchanges)
- Projects in the GIZ's "green sector cluster" (ProCIVA, ProAgri4, ProSAR, ProFINA, RBT WAP): support stove SMEs to strengthen their managerial and productive capacities to better meet the cooking equipment needs in the green sector. (ongoing exchanges)
- Intercommunal bodies (GIC) and intermunicipal associations (ADECOP, APIDA, ACAD): capacity building for them to be able to integrate issues related to cooking energy in their planning activities and to develop consistent communication campaigns to change people's behaviour towards the adoption of ICS.
- Fuel wood sector and connected NGOs (GERES, GERME): establish a framework for exchange to explore options for the development of alternative fuels.
- Potential for collaboration in additional sectors like tourism, catering and restaurant business exist; however, appropriate partners have not been identified so far.

## Solar Component

### Sector alignment

The objective of the government is to bring the national electrification rate above 90% by 2035 as opposed to the current 29,2%. The SNE, under elaboration by the DGRE, however, does not consider universal grid electrification as a feasible instrument to achieve this



objective. The government rather envisages the use of off-grid electrification based on RE to cover the needs of a significant part of the population, mainly in rural areas. In addition to this, apart from the above mentioned national plan for the integration of gender in energy, the energy law (2018) as well as the decree for off-grid electrification (2020) integrates the obligation to consider gender equality and social inclusion in energy projects. Finally, EnDev Benin aligns with EnDev's Rural Electrification Discussion Paper by fulfilling many of the suggestions as, for example, collaboration with national programmes and other donors as well as the 'leave no one behind' approach.

The main value added of EnDev Benin consists in: it is the only institution that focuses on off-grid energy and works in rural remote areas, which are not covered by any other cooperation programmes. This is very important because the lack of availability of electricity is a main constraint for the social and economic development of rural areas, mainly in the half north of the country; More than 85% of the companies active in the off-grid solar market are implementing partners of us; So far, no other cooperation institution has shown interest in developing the e-waste industry in Benin; No other institution is supporting the government in the development of a global approach for quality assurance of off-grid solar products, companies and services.

### **Implementer base**

Apart from EnDev, a few other initiatives are also supporting the off-grid PV sector in Benin. We are already collaborating with:

- DGRE: EnDev participates in the debates for the preparation of the SNE. Besides, we have ongoing discussions to collaborate on quality certification of solar products and companies, the elaboration of a national plan for e-waste management, the analysis of the impact of international companies in the national market. We are also debating the need of a strong and efficient professional association for the sector.
- ABERME: collaboration on the promotion of the presence of off-grid solar companies in rural areas (leave no one behind approach) as well as on tax-exemption mechanisms for solar off-grid products. It is envisaged to provide support for a pilot RBF activity implemented by ABERME.
- OCEF (MCA Benin): it is financing the electrification of several localities based on hybrid solutions (solar mini-grid plus solar off-grid equipment) implemented by the private sector. Exchanges on e-waste solutions are ongoing. Collaboration to lobby on quality certification is also envisaged. MCA has a small unit on gender with which we are in contact. MCA support is helping companies to consolidate their financial capacities, which means that they will require lower subsidies in the future. It will be explored how EnDev could benefit from its lessons learnt and contribute to the sustainability of its activities once MCA interventions end in 2022.
- CLASP: it is responsible for the VeraSol quality certificates, which have been the quality reference of EnDev Benin in recent years. CLASP is also promoting solar technologies for PUE through the Global LEAP Awards. In addition to this, CLASP has done extensive work on proper e-waste disposal. Exchanges on all these topics will be carried out.

We are exploring collaboration opportunities with:

- GBE (GIZ project): it is working on off-grid and mini-grid solar systems. The lessons learnt from the results of its innovative experiences on the promotion of solar

technologies for PUE (RBF approach) and SI (fee-for-service approach) applications will be useful to EnDev as a model for replication and up scaling. GBE is also co-financing with CGeD a traineeship programme for young female engineers assigned at public and private partner organisations from which EnDev will be able to learn.

- ProMERC (GIZ project): it supports the development of the policy and regulatory framework for the electricity sector at the regional level. Training and certification of professionals, as well as the implementation of regional standards, are part of its activities.
- ROGEP (WB project): it is a regional project which provides business development support to solar companies at the regional level. No companies from Benin have applied to this programme so far because they do not feel prepared to jump into the international sphere. EnDev will introduce the international axis in its capacity development activities.

## Leverage

The project intends to:

- Continue exchanges with the EU Delegation, which has expressed interest in co-financing activities related to the development of an e-waste strategy for the country, applications of PUE in agriculture, promotion of gender equality, and rural electrification ("leave no one behind" approach).
- Continue using the leverage with the private off-grid solar sector. So far, the average incentive contributed by EnDev to the private sector is below to 30% of the market price of the sold equipment.
- Exchange with the GIZ sectoral project on waste management. It has developed interesting approaches.

## Nexuses

Actors in other sectors with which we will pursue collaboration are:

- Projects financed by the Dutch cooperation (BeniBiz, NUFFIC, EJASA): promote energy applications in the value chain in the agriculture sector. Special focus on women and youth. (ongoing exchanges)
- The association of credit institutions for agriculture (FECECAM): provide loans for PUE applications in the agriculture sector.
- The National Institute for Research in Agriculture (INRAB): promote transfer of solar technologies for applications in agriculture.
- Potential for collaboration in additional sectors like tourism, bars and food shops exist; however, appropriate partners have not been identified so far.

## 1.2.5 Modalities

### General comments RBF and co-financing

EnDev Benin already has a solid experience in RBF. Partner companies that participate in RBF activities are selected through a call for proposals. The call is opened to national and international companies registered in the country that comply with diverse criteria related to: managerial capacities, minimum financial capacities, experience in the sector, gender equality, etc.

RBF activities are directly managed by EnDev Benin with the support of external verification agents. The option to delegate the management of a RBF activity into a financial institution (FI) was examined in the past. However, it was rejected because of the high costs and the lack of real interest from the FI side to make it sustainable as a part of their long-term business. The core management of a RBF activity (without verification) is not resource intensive, it only requires the part time dedication of a team of two people.

The use of co-financing in the form of local subsidies and financing agreements will be prioritised as an instrument to transfer capacities based on “learning by doing”. This will be used with FASN, GIC, UNACooPFA, private companies and municipal associations by the cooking component, and with ABERME, DGRE, INRAB and private companies by the solar component.

The requested budget for the period 2021-2024 (see section 9, Budget) will allow EnDev Benin to basically carry out technical assistance (TA): capacity building, institutional support, sensitisation, analysis and research activities. RBF and co-financing activities are very limited. As detailed in the Excel budget submitted along with this proposal, the implementation of extended RBF and co-financing activities are only considered in case that additional budget is acquired. As explained below, EnDev Benin is already working towards this objective.

## Cooking Component

### Approach

It is based on the development of capacities of the supply side of the ICS market that will allow its medium-term professionalisation as a key factor to reach sustainability. To this effect, firstly, we will continue to assist the 15 priority ICS cooperatives to consolidate them and make them move from "efficient craft" to "semi-industrial" production. Secondly, in order to accelerate changes in the clean cooking sector, companies already consolidated in connected sectors (ceramics, bricks, metal works, etc.) will be integrated into the ICS market. Thirdly, ICS distributors will be supported to expand their business areas beyond the already saturated market nearby the production units (usually in urban localities) into more remote (rural) areas. Fourthly, institutional stakeholders such as professional associations (UNACooPFA), university (LEMA), local administration (GIC, ADECOB, APIDA, ACAD) and government bodies (FASN) will be involved in the above-mentioned points. And, lastly, the project will support the government to consolidate the framework conditions that will underpin the professionalisation process.

We consider as high-tier stoves: improved PU and SI models as well as e-cooking. Related to PU (and SI) models, EnDev Benin is analysing several models existing in the market for several value chains in order to improve the design of those that will be finally selected. Concerning e-cooking, as mentioned above, EnDev is currently carrying out an analysis of the potential for e-cooking in Benin. This is complemented with the purchase and testing of e-cooking equipment that will be tested by the team (Jet Flame, Ibuttum, electric press cooker). The decision of the type of e-cooking that the project will promote will be based on the results of these preparatory activities. It can be anticipated, though, that quality certificate (e.g. Ver-alSol) will be required to the supported models.

## Planned activities

To implement our approach:

- Specific and adapted BDS will be provided to private implementing partners: producers and distributors (cooperatives and companies).
- PUE projects will be promoted in the agriculture sector. Analysis will be carried out to identify the value chains with a higher potential for PUE and where impact on gender equity could be higher. This will be complemented by female entrepreneur skill development activities.
- The synergy with ProFINA will be used to facilitate the development of financial products adapted to ICS users, with particular potential interest for PU. The use of discount voucher will be considered.
- The organisation of behaviour change campaigns (BCC) by UNACooPFA with co-financing support from the project will complement the use of discount vouchers and financial products for users. Some of these events will be organised in partnership with ABERME, mainly for the promotion of high-tier stoves.
- Collaborations with FASN and WFP will be pursued with the perspective of setting up contracts between these institutions and UNACooPFA. This will motivate the association and its members to develop their capacities up to the required level to be able to serve large customer orders. In parallel, EnDev is preparing UNACooPFA to be able to assume such challenges. Support is given in the form of a local subsidy to co-finance the salary of a qualified person for one year, plus basic office equipment and capacity development activities.
- Collaboration with the ONG GERME, the fuelwood sector and LEMA to develop alternative fuels appropriate for ICS.
- Support will be provided to DGRE to develop the political and regulatory framework: action plan, national committee and standards. A solid and clear framework is essential to attract and keep new companies in the sector.
- Measures defined in the gender strategy for EnDev Benin will be crosswise integrated in all activities. Special attention will be given to PUE projects.

Some of the activities will have a very low profile until additional budget arrives:

- LEMA will be supported (the project will finance some capacity development measures and will assist in the search of additional funding for equipment and infrastructure). to consolidate its capacities and become a permanent innovation and training centre for ICS. In dialog with manufacturers and distributors, the laboratory will be able to provide support for the continuous adaptation of stove models to meet market changing needs and conquer new niches, including PU and SI.
- The acquisition of manufacturing and distribution equipment will be facilitated (co-financing with UNACooPFA). Appropriate equipment is necessary to cover the growing and increasingly diversified demand of ICS, not only for HH but also PU and SI.
- The long-term active participation of local authorities to expand and consolidate the ICS distribution network will be promoted. For example, with the co-financing from EnDev, municipalities can build selling points and carry out sensitisation campaigns that include demonstration shows, fix advertisements and radio messages.

Some activities will be in standby until additional budget is available:

- RBF will be used to incentivise the expansion of the distribution network and the commercialisation of higher-tier (PU and e-cooking) stoves. It is expected that this will attract companies with consolidated large distribution networks and enough financing capacities to import electric and solar cookers and solar dryers.

Justification - The professionalisation approach has been inspired by the market evolution in Senegal and Kenya. The ICS market in Benin, which is consolidated in the pioneering phase, needs more seasoned and professional actors to be able to shift into the expansion phase.

### **Effectiveness and Efficiency**

Our professionalisation approach is based on the development of capacities. The result will be to have empowered market actors, able to independently decide their own strategies (as individuals and as a sector) and to respond to the needs of the market (innovate, produce, commercialise). Once professionalisation is reached, in contrast with what currently happens, the ICS sector will no longer need the guidance of EnDev. Efficiency – The proposed measures, based on the provision of TA can be managed by a relatively small team, in contrast with the large number of advisors that the project had in the past to permanently accompany the activities of our implementing partners in the field. The use of digital tools for M&E activities will also limit the need for personnel.

## **Solar Component**

### **Approach**

It is based on providing support to the sector with a special focus on important aspects that the own market dynamics have not been able to address so far. Firstly, we will support the government to set up the framework conditions to assure the quality of all off-grid solar equipment and services. Secondly, we will also support the government to develop the framework conditions to ensure that off-grid solar equipment does not cause an environmental problem at the end of its life cycle. And, finally, we will create opportunities for the market to reach the population in rural areas, support the most vulnerable and promote PU equipment.

### **Planned activities**

Activities that will directly support our approach are:

- The project will support the DGRE to integrate minimum quality assurance issues in the existing regulatory framework.
- BDS will be provided to our solar partner companies to develop their entrepreneurial skills to conquer new markets such as rural areas and international opportunities (e-waste management activities show a particular potential for exportation of services due to the lack of consolidated experiences in the region). This will cover issues such as quality (certification, warranty, etc.), promotion (marketing, post-sales services, etc.), and medium and long-term strategic planning.
- The project will assist the DGRE in the development of a first version of a national plan for e-waste management, including the appropriate related regulatory framework to allow its efficient application.

- The project will support ABERME to coordinate promotion campaigns in rural areas with the active participation of solar companies and the municipalities. Instruments such as demonstration shows and radio and TV messages will be used.
- A tax-exemption mechanism will be designed in collaboration with ABERME. The objective is to make products more attractive by keeping prices low. This is particularly important in rural areas, where the purchasing power is low.
- PUE projects will be promoted in the agriculture sector. Analysis will be carried out to identify the value chains with a higher potential for PUE and where impact on gender equity could be higher. This will be complemented by female entrepreneur skill development activities.
- Cooperation with INRAB will ensure that innovation by the transfer of solar technologies to the value chains of agriculture is ensured in the long term.
- Collaboration with credit institutions (e.g. FECECAM) will facilitate the development of financial instruments for PU applications in rural areas. This will provide access to finance for agribusiness entrepreneurs and will anticipate the future gradual reduction of RBF subsidies.
- Measures defined in the gender strategy for EnDev Benin will be crosswise integrated in all activities. Special attention will be given to PUE projects.

Some of the activities will have a very low profile until additional budget arrives:

- The project will support pilot activities to test different aspects considered in the e-waste plan (infrastructure, private participation, commercial models, sensitisation campaigns, capacity building).

Some activities will be in standby until additional budget is available:

- A specific RBF ('RBF e-waste') will be tested as a mechanism to incentivise the management of e-waste according to the national plan.
- RBF will be used to incentivise solar companies to expand their business activities into rural and poor peri-urban areas ('RBF last mile'). This incentive will compensate the additional effort that companies have to make to trade in zones with difficult access and average low purchasing power.
- RBF will also be applied to subsidise solar products for PU projects in the agriculture sector ('RBF PU') to support the economic development of rural areas.

Justification - Markets are not perfect and not necessarily internalise social and environmental aspects by themselves. Also aspects that should be positive for the development of the market such as the use of quality certificates, may not be internalised if market stakeholders do not have the necessary capacities to do it.

### **Effectiveness and Efficiency**

The project will provide stakeholders with better framework conditions and improved capacities to facilitate the development of its activities, which will result in a more dynamic and sustainable market, also for rural customers. This contrasts with the unsustainable equipment donation approach promoted by ABERME for rural electrification in the past. Efficiency - The proposed measures, based on the provision of TA can be managed by a relatively small team as already shown in the past. The use of digital tools for M&E activities will also limit the need for personnel.



## 1.2.6 Results

### Beneficiaries (“adjusted numbers”)

Figures presented in the next table are related to the requested budget (see section 9, Budget). Additional funding would allow to increase these figures.

There are ongoing discussions with HQ to review the estimation of results for the solar component. This is the reason why no figures are presented for access to energy.

Project results	Absolute targets (2010-2024)	Additional targets (2021-2024)
People: Access to Electricity	141.546	49.074
People: Access to Cooking	654.163	289.726
SI: Access to Electricity	0	0
SI: Access to Cooking	750	750
PU: Access to Electricity	90	59
PU: Access to Cooking	1.088	943

Whenever possible, the results will be provided disaggregated by gender (e.g. number of PU businesses lead by women). The estimated figures in this table, however, cannot be disaggregated by gender. It will be first necessary to analyse the several value chains on which we plan to work (activity already planned) to estimate the impact on gender equality that each one has.

### Outcomes (other than beneficiaries)

#### Cooking Component

- (SDG5) Gender inequality in the ICS sector has been significantly reduced at all levels (as mentioned in section 8 (Gender), specific actions for implementation and their related indicators will be selected during our forthcoming operational planning exercise. Nevertheless, it can be anticipated that priority will be given to indicators that measure the percentage and role of women that participate in our interventions)
- (SDG5) (SDG8) At least 15 companies (and cooperatives) produce in average > 1.000 ICS/month/company (results will be disaggregated by gender)
- (SDG5) (SDG8) At least 3 consolidated companies are involved in the importation/production of high-tier ICS (results will be disaggregated by gender)
- (SDG5) (SDG8) At least 10 consolidated companies are involved in the distribution of ICS (results will be disaggregated by gender)
- (SDG5) (SDG8) At least 270 new jobs have been created or maintained (results will be disaggregated by gender)
- (SDG1) (SDG3) (SDG4) (SDG5) Sales have significantly increased in rural areas (at least multiplied by 5)
- (SDG1) (SDG3) (SDG4) (SDG5) At least 2.500 vulnerable households have access to ICS
- (SDG8) The UNACooPFA is able to independently manage its own projects



- (SDG1) (SDG3) (SDG4) (SDG5) The provision of ICS for vulnerable population has been integrated in the annual planning by the MASMf
- (SDG8) The market is able to innovate in appropriate ICS models, mainly for PU in agriculture and school canteens
- (SDG8) E-cooking stoves have been integrated in the market (at least 2 companies commercialise them as a regular product)
- (SDG5) Consumers are aware of advantages of using efficient ICS and have changed their behaviour with regards to the choice and use of cooking equipment
- (SDG8) National minimum standards for ICS are available
- (SDG3) (SDG5) (SDG8) (SDG13) The National Action Plan for Clean Cooking has been approved
- (SDG3) (SDG5) (SDG8) (SDG13) The National Committee for Clean Cooking is operative
- (SDG8) Tax exemption for high-tier cooking equipment is in place
- (SDG5) (SDG8) Availability of capacity to support entrepreneurs in the development of business plans for ICS businesses and PUE projects has been consolidated (results will be disaggregated by gender)
- (SDG8) Financing institutions understand better the dynamics of the ICS market (at least 3 FI have participated in our pilot activities)
- (SDG13) CO<sub>2</sub> emissions have been avoided
- (SDG3) (SDG5) Cases of diseases because of air pollution in kitchens have been reduced
- (SDG13) Anthropogenic pressure on forest resources has been reduced

### Solar Component

- (SDG5) Gender inequality in the off-grid solar sector has been significantly reduced at all levels (as mentioned in section 8 (Gender), specific actions for implementation and their related indicators will be selected during our forthcoming operational planning exercise. Nevertheless, it can be anticipated that priority will be given to indicators that measure the percentage and role of women that participate in our interventions)
- (SDG5) (SDG8) At least 20 companies regularly commercialise off-grid solar products in the market (results will be disaggregated by gender)
- (SDG5) (SDG8) (SDG13) At least 3 companies have participated in pilot activities for e-waste management with good results (results will be disaggregated by gender)
- (SDG5) (SDG8) New jobs have been created (results will be disaggregated by gender)
- (SDG1) (SDG4) (SDG5) Sales of PV equipment have been significantly increased in rural remote areas (at least multiplied by 5)
- (SDG1) (SDG4) Time devoted to study of children in rural areas has significantly increased
- (SDG8) Off-grid solar companies of the formal market commercialised products with quality certificates officially accepted by the government. Commercialisation of non-certified products has been minimised
- (SDG8) Minimum quality assurance criteria have been integrated in key sector regulations
- (SDG5) (SDG8) (SDG13) A national plan for e-waste management has been tested and submitted for approval

- (SDG8) Tax exemption for off-grid solar equipment is in place
- (SDG8) Framework conditions for the harmonious integration of international companies in the off-grid solar market exist (as introduced above, this should prevent that restrictive regulations to protect local companies in front of international competition are set up as advocated by some government members)
- (SDG8) The market is able to provide innovative solar equipment for PUE
- (SDG5) Consumers are aware of advantages of using quality products and have changed their behaviour with regards to the choice and use of solar equipment
- (SDG8) Availability of capacity to support entrepreneurs in the development of business plans for PUE projects has been consolidated (results will be disaggregated by gender)
- (SDG8) Financing institutions understand better the dynamics of the solar off-grid market (at least 3 FI have participated in our pilot activities)
- (SDG13) CO<sub>2</sub> emissions have been avoided

### **Impacts**

The project will develop indicators for the outputs listed right above. These indicators will be monitored along with the number of beneficiaries. This will facilitate the continuous evaluation of the impacts listed in section 2 (Theory of change) and the expected changes described in section 3 (Transformative character). All results will provide valuable information for the cooking and solar markets in Benin, which will be shared with our political and implementing partners. As soon as new budget availability allows it, these results will be the base for sector analysis we plan to carry out as part of our market intelligence and knowledge sharing interventions.

## **1.2.7 Sustainability**

### **Cooking Component**

#### **Financial sustainability**

It is fragile. On the one hand, producers and distributors cannot mobilise the necessary investment to scale up their production or expand their distribution networks. The lack of managerial capacities and proven feasible business cases prevents the involvement of FIs. On the other hand, relatively low income of potential users, with no access to appropriate financing, limits the commercialisation of expensive high-tier ICS (PU and SI, and e-cooking). In the long term, consolidated large producers and distributors will be able to face the financial challenges of the changing demand needs and may also be able to facilitate consumer financing. By end 2024, it can be anticipated that several SMEs will be consolidated in the market and capacity to cover high-tier ICS demand will exist. Project contributions to this interim situation will be to:

- Facilitate engagement of consolidated and bankable companies from connected sectors into the production, distribution and import of ICS.
- Support development of financial products adapted to SMEs that produce, commercialise and use ICS.
- Promote tax exemptions for e-cooking along with exemptions for solar products.

- Whenever additional budget is available: Implement RBF to finance the expansion of distribution networks and the commercialisation of higher-tier stoves to attract new companies in the stove market

### **Institutional sustainability**

It is under construction. Traditionally, the main topic of national energy initiatives has been electricity. Today, the government recognises the important role of biomass in the national energy mix and gives priority attention to clean cooking; however, clean cooking is not yet well addressed by framework conditions. Besides, ICS market stakeholders are still not well organised to defend their sector interests.

In the long term, ICS will be fully integrated in energy policies and development plans, and a consolidated professional association will exist. By end 2024, it is expected that ICS will be already integrated in the main energy policy and regulatory documents and will be some good replicable examples of integration in provincial and municipal (annual) development plans. The professional association will be able to manage its own projects and will have accumulated experiences in fruitful collaboration with the government. Project contributions to this interim situation will be to:

- Support the government in the integration of clean cooking into the institutional framework by developing a national plan and setting up an inter-ministerial committee.
- Develop capacities of intermunicipal and municipal structures to the strategic planning and the implementation of projects related to clean cooking.
- Assist UNACooPFA in the development of its organisational capacities, and in the establishment of large contracts with institutional structures.

### **Ecological sustainability**

It is not seen as a priority. The adoption of ICS is not yet perceived by most of the population, particularly in rural areas, where firewood is still quite easily accessible to all, as a basic ecological good practice. Besides, availability of alternative fuels as well electric cooking equipment remains very limited. On the other hand, sustainable management of clay quarries and waste of e-cooking component are not yet seen as a problem.

In the long term, traditional cooking equipment will be replaced by a balanced mix of quality ICS, electricity and gas based cooking equipment. In addition to this, local authorities will be able to supervise the correct management of quarries and residues. By end 2024, the cooking market will still be dominated by fuel base cooking, with a significant part of the market covered by quality ICS. Local authorities will have better capacities to monitor environmental aspects. Project contributions to this interim situation will be to:

- Raise awareness on the negative impacts and risks of using traditional cooking systems.
- Promote low-cost electric and solar cooking equipment.
- Promote alternative fuels to wood and charcoal in synergy with other partners.
- Support local authorities to develop sustainable plans for the use of clay quarries.
- Integrate e-cooking residues in the e-waste management activities.

### **Technological sustainability**

It has not been addressed yet. ICS have a relative short lifespan (2 years in average). Small domestic clay stove are simply replaced by new ones when they broke down. Reparation of larger size stoves (PU and SI) is worth doing, but expert artisans are not always available.

Currently, innovation capacity is also not accessible to the market, which prevents the development of ICS models adapted to evolving demand needs.

In the long term, the market will have several durable technical assistance options for reparation and innovation for each type of available technology. By end 2024, LEMA could be playing this role related to ICS technologies. In addition to this, the application of standards will guarantee the quality of the materials and manufacturing process for an optimal live span.

Project contributions to this interim situation will be to:

- Develop LEMA's capacities to become a permanent innovation and training centre for ICS.
- Support FASN to set up a programme to periodically replace old stoves in vulnerable communities.
- Assist the government in the development of national minimum standards for ICS.

### **Social sustainability**

It is quite high. Most of the promoted stove models are accepted by the populations and have a use and replacement rate above 65% according to data collected by the project. However, their penetration level is very low in rural areas, because of lack of knowledge of the advantages of ICS, and among the most vulnerable social classes, because of limited purchasing power. It is also important to highlight the general perception of the "anfani" brand as a warranty of quality, which anticipates that the future national standards will play a positive role in the marketing and multiplication of ICSs sales.

In the long term, all population will be able to choose between quality ICS, electricity and gas based cooking. By end 2024, presence of quality ICS in rural areas will be significantly increased, and government's social protection strategies for the most vulnerable will include ICS. Project contributions to this interim situation will be to:

- Intensify awareness raising of advantages of using ICS in rural areas.
- Collaborate with the government to carry out pilot projects to show the effectiveness of including ICS in public social protection initiatives.

### **Exit & handover strategy**

It is based on the progressive transfer of knowledge and responsibilities into the public and private market stakeholders:

1. DGRE should assume the responsibility of assurance of the quality of all ICS and e-cooking products produced and commercialised in the country. This requires setting up national standards (by end 2021) and the consolidation of testing facilities such as LEMA (by mid 2023).
2. ABERME should assume the responsibility of the continuous long-term promotion of efficient ICS (including e-cooking) into rural areas. The project will support ABERME to be able to independently carry out promotional campaigns (by end 2021) and independently design and implement specific financing support mechanisms such as RBF (by end 2024).
3. FASN should assume the responsibility of the provision of ICS for vulnerable population. The project will promote that FASN always plans in its annual budget a specific item for this purpose (from budget for 2023 onwards).
4. UNACooPFA should take the responsibility of the continuous development of capacities of its members and of permanent technology innovation in the stove market. This will be promoted by supporting the significant improvement of the organisational capacities of

the association (by end 2024) and by setting up a long-term collaboration agreement with LEMA (by mid 2022).

5. The financial sector, with the support of the project, should be familiar with the ICS market and have available several tested financial mechanisms, also for PU projects (by end 2024)

## Solar Component

### Financial sustainability

It is fragile. FIs are still very reluctant to support local companies. Most of the few companies with solid access to commercial credit support are international firms. As a result, off-grid solar companies rely on subsidies from cooperation programmes to complete their business plans. Limited access to financing also affects potential customers such as PU applications. It can be anticipated that future e-waste management companies will face similar constraints. In the long term, fewer solar companies will be in the market and they will be supported by international structures. They will be able to facilitate consumer financing (e.g. PAYGO). Financing institutions will be able to provide solutions for larger solar PU systems as well as for e-waste management companies. By end 2024, companies supported by RBF will have strengthened their structures and consolidated their businesses with limited need for support from commercial FIs. Alternative financing mechanisms for PU projects as well as for e-waste companies will have been tested. Project contributions to this interim situation will be to:

- Explore and test alternative financial instruments for solar companies in collaboration with financing institutions.
- Support the development of business plans for PU and e-waste projects.
- Whenever additional budget is available: Implement RBF to support solar companies, PU projects and e-waste management companies.

### Institutional sustainability

It is under construction. Existing policy and regulatory framework for the electricity sector is quite recent and the off-grid solar market has not been well addressed yet within it. Regulations on quality assurance, tax exemption, e-waste treatment and equipment efficiency, do not exist or are under development. The government has opened a debate about the role that international companies should play in the national market because considers that they are not fair competitors for national companies. A professional association (AISER) exist but, despite the support given by EnDev for three years, it does not have yet the capacity to represent sector interests because of internal problems such as lack of transparency and lack of interest in becoming a service provider for all members instead of being a platform for the promotion of only a few of them (support stopped in 2019 and will only resume if conditions change).

In the long term, off-grid solar energy will be fully integrated in energy policies and regulations, and a consolidated professional association will exist. By end 2024, regulations on the above-mentioned issues, including the role of international companies, will be in place. The professional association will be forced by the government to correct its internal organisational inefficiencies. Project contributions to this interim situation will be to:

- Support the improvement of the policy and regulatory framework.
- Build institutional capacities for the application of quality certification.

- Promote the setup of partnerships between national and international companies.
- Lobby before the government to restructure AISER.

### **Ecological sustainability**

It is a latent problem. The commercialisation of solar products reduces the use of kerosene lamps, battery torches and diesel generators, which has a positive effect on CO2 emission reduction; however, the life span of solar components is limited and subject to replacement. The number of elements to be replaced by the first solar products commercialised under EnDev will be significant soon, but no related measure has been taken so far. In parallel, the government has expressed the same concern related to the several other projects that have distributed and installed solar products all over the country in recent years.

In the long term, full e-waste management policies and regulations for Benin will exist. By end 2024, a national plan for e-waste management will be approved and basic e-waste management infrastructure will be in place. Project contributions to this interim situation will be to:

- Support the definition of a national plan for e-waste management.
- Promote pilot activities to test different aspects considered in the e-waste plan: integration of the private sector, sensitisation campaigns, capacity building.
- Whenever additional budget is available: Implement a specific RBF to incentivise e-waste treatment.

### **Technological sustainability**

It is under construction. Companies that benefit from the RBF implemented by EnDev Benin are obliged to provide a guarantee that covers original defects of all product elements. Depending on the size, the required guarantee period can reach two years. Therefore, replacement and repair infrastructure exist. Besides, the requested quality certification for all products leads to longer life cycle periods than for non-certified products. On the other hand, the presence of international firms facilitates the quick introduction of innovations.

In the long term, quality certificates, guarantees, as well as post-sales replacement, reparation and maintenance of products will be consolidated as part of marketing strategies to compete in the market. Access to innovation will be guaranteed by the presence of international companies. By end 2024, the use of quality certificates will be common practice and companies will have better skills on post-sales services. Project contributions to this interim situation will be to:

- Develop capacities on entrepreneurial skills, including post-sales services.
- Intensify awareness raising of advantages of using certified products.
- Support the not limitation of international companies in the market.
- Set up a partnership with INRAB to guarantee the permanent innovation on PUE.

### **Social sustainability**

It is evolving positively. Confidence in solar products has greatly evolved. On the one hand, most of customer opt for payment in instalment, which allows them to effectively enjoy their product even before the total payment. On the other hand, warranties allow customers to receive a new product in case of defect. Nevertheless, an important informal market, dominated by non-certified low-quality products, mainly in rural areas, persists.

In the long term, the market will be dominated by good quality products and the informal market of non-certified low-quality products will be marginal. Population in general will be able to distinguish between quality and non-quality products thanks to the use of certificates. By end



2024, the formal market will exclusively commercialise products with quality certification. Off-grid solar products will be more accessible in rural areas and for the most vulnerable. Project contributions to this interim situation will be to:

- Promote the use of products with quality certification.
- Intensify awareness raising of differences between certified and non-certified products in rural areas.
- Whenever additional budget is available: Implement a specific 'RBF last mile' for rural areas and the poor.

### **Exit strategy**

It is based on the progressive transfer of knowledge and responsibilities into the public and private market stakeholders:

1. DGRE should assume the responsibility of assurance of the quality of all off-grid solar products commercialised in the country. This requires the adoption of quality standards and its effective implementation (by beginning of 2023). DGRE should also take the responsibility of the minimisation of the environmental impact of the solar market. A first proposal for a national plan for e-waste management (by mid 2022) should be tested with several pilot projects (by end 2024) before the approval of a final version.
2. ABERME should assume the responsibility of the continuous long-term promotion of off-grid solar equipment in rural areas not covered by grid-based electrification plans. The project will support ABERME to be able to independently carry out promotional campaigns (by end 2021) and independently design and implement specific financing support mechanisms such as RBF (by end 2024).
3. The financial sector, with the support of the project, should be familiar with the off-grid solar market and have available several tested financial mechanisms, also for PU projects (by end 2024)

### **1.2.8 Gender Strategy and Safeguards**

The gender analysis and strategy for EnDev Benin has been completed in December 2020. The final document (reviewed after the feedback received in February 2021) is attached to this proposal.

As reflected in the analysis, the policy and legal framework for the energy sector in Benin already integrates the need of paying attention to gender-related issues, but concrete proposals on indicators are missing. Besides, initiatives such as the CGeD and the gender unit in ABERME lack of a consolidated specific budget, which jeopardise their operational capacity. In addition to this, the education system, mainly at the university level, is still very far from gender equity in technical studies, which limits the availability of female energy engineers and economists in the market. This is reflected, for example, in the fact that less than 35% of employees in off-grid solar companies are women, percentage that is reduced to less than 15% in the case of positions of responsibilities in the same companies. In the stove market, although 77,4% of the workforce is feminine, in the professional associations, women are represented with less than 50% of the managerial positions and very scarcely in the leading positions.



EnDev Benin would like to work to improve this. Chapter 6 includes a detailed list of measures that EnDev Benin has identified to contribute to the transformation of the renewable energy sector in Benin into an equitable and gender sensitive sector. This includes actions for the promotion of gender equity as well as actions to avoid or minimise potential non-intended negative effects. Some of the measures are general for EnDev Benin, but most of them are specific for each of the two components: cooking and solar. The measures that EnDev Benin will actively implement (and the related indicators) have not been defined yet. This will be done during the internal process of definition of the detailed operational plan for EnDev Benin once this proposal is approved.



The budget submitted along with this proposal considers a modest dedicated budget line for gender-specific activities. With it, EnDev Benin will try to integrate all identified measures as much as possible in all planned activities. In addition to this, as explained in section 9 (Budget), we are looking for additional budget. With it we could recruit a national gender specialist and have a larger dedicated budget line for gender-specific activities. Three main objectives linked to these resources are:

- Ensure the implementation of the activities defined in the gender analysis.
- Support the implementation of the PUE activities of EnDev Benin, which, as described above, will focus on woman (and youth) promotion.
- Accompany the CGeD in the implementation of the national strategy for the integration of gender and other social aspects in the energy sector. This could include the organisation of events in partnership with the women's association at the university to encourage the participation of women in the RE market (old idea from the 2019 proposal not yet implemented).

EnDev Benin reiterates its will to participate in the announced project between EnDev and ENERGIA as soon as new budget availability allows it.

# 1.3 Bolivia

## 1.3.1 Summary and key data

Promoted technologies	 			
	<p><b>Higher tier electrification:</b> Support to demand and supply side to increase number of connections and reduce connection costs, Integration of pre-pay/smart metering systems.</p>			
	<p><b>Solar market development:</b> Fostering market development for solarPV products and solar appliances in alliance with the partner ENERGETICA. Facilitating alliances between private sector and financial mechanisms for solarPV.</p>			
	<p><b>Productive use of energy (PUE):</b> Financial &amp; technical support to promote PUE with special focus on agriculture, forestry and fishing sector with higher tier productive equipment, in alliance with three partners IICA, PRACTICAL ACTION and ENERGETICA. Facilitating financial system involvement, increasing capabilities in PUE for developing financial products, linking rural communities to credit opportunities.</p>			
	<p><b>PUE Women Fund:</b> Facilitate access to PUE technologies for MSME's led by women or men (the latter with at least 40% women representation as staff), provide training for improving financial capabilities and participation; and for strengthening business skills.</p>			
	<p><b>Innovative financing mechanism:</b> The <i>Fund for Sustainable Access to Renewable Energies</i> (FASERTE) established with IICA (Inter-American Institute for Cooperation on Agriculture) in 2018 with a special focus on PUE for the agricultural sector. It will be linked to the PUE Women Fund.</p>			
Summary of proposed interventions	<p><b>E-waste:</b> Conducting a study to analyse e-waste management possibilities (market reach, identify key actors, national opportunities); this study will set the base for future strategies.</p>			
		<b>Quantitative targets</b>	<b>Further relevant impacts/outcomes</b>	
	Energy for lighting / electrical appliances in households	[ 35,104 ]	[ People ]	<ul style="list-style-type: none"> <li>-Strengthening solar market technical and financial capacities.</li> <li>-Improvement of payment systems.</li> <li>-Qualification of rural electric technicians.</li> </ul>
	Electricity for social infrastructure	[ 34 ]	[ SI ]	<ul style="list-style-type: none"> <li>-Improvement of rural schools' access to electricity.</li> </ul>
	Energy for productive use / income generation	[ 6,770 ]	[ MSME's ]	<ul style="list-style-type: none"> <li>-Women entrepreneurs with access to technology and training.</li> <li>-Financial products for PUE.</li> <li>-Productive projects supported by trained personnel.</li> <li>-Higher technologies are used for productive uses.</li> </ul>
	Project period	01.01.2021 – 31.12.2023	<b>Indicative Budget</b>	EUR 2,998,119

### 1.3.2 Theory of change (ToC) and state of market

Universal access to electricity is an objective of the National Patriotic Agenda 2025 of the Government of Bolivia. Although electricity coverage in rural Bolivia advanced significantly in the last decade (from 33% to 86% since 2006), there is still limited access, use, and application of energy services and products. Despite national efforts, some remote rural areas will not be connected to the national grid in the medium- to long-term, which represent the primary intervention areas targeted by EnDev. Bolivia ranks among the poorest countries in Latin America and has a difficult topography challenging cross-country transport and access, which make it difficult to reach the poorest and most vulnerable rural populations with electricity. This challenge has been exacerbated by social and political unrest after failed 2019 national elections and the COVID-19 pandemic. Compared to the universal access objective, the growth in access to modern energy services and products for households, small enterprises and social institutions in remote rural areas in Bolivia is growing slower than anticipated (**core problem**).

In the on-grid sector, local utilities and rural cooperatives face challenges to fulfill their mandate. Connection costs to the grid are high and households lack capacity to pay for connection fees. Technical energy losses and incorrect billing due to mal-functioning, old or broken electricity meters are the results of low financial capacity to invest and repair. Households, responsible for the internal electric wiring also lack resources and knowledge for safe and adequate installation. A reduction of the connection costs, access to local technicians for safe internal connections and correct billing can provide an affordable and reliable access to electricity. The replacement of broken meters and modernization of systems (smart and pre-pay metering) will improve rural service. With connection costs reduced, nearby communities can access electricity generated in nearby solar parks and mini grids.

Whilst the government is highly interested in solar solutions in the off-grid sector, it is not market development oriented and government policy does not prioritise improving the business environment. Efforts from the private sector to achieve market growth and diversification face unfavorable conditions. This results in high-risk perception from the supply side of the solar market contributing to companies' lack of experience and resources to develop new business models and innovative payment schemes. The COVID-19 pandemic has stagnated or even reversed many positive trends in supply and demand markets. Low level of diversification of certified solarPV and solar appliances can be improved with access to capital and investment for suppliers. A legal framework and regulation can facilitate import services. Rural schools equipped with solarPV due to bad installations and broken batteries do not have electricity. If the municipalities in charge of the schools work together with school parents' organizations, there is a possibility to recover the systems.

Whilst the Ministry for Productive Development supports the provision of equipment for PUE, it does not provide any accompanying measures on proper operation and maintenance and intermediate technology is not prioritized in national policies and strategies. Demand is inhibited by lack of tailor-made financial products and services for small scale PU technologies and there is limited access to higher tier productive activities, especially for women. The supply is equally restrained by low growth and diversification of PU technologies and a lack of access to capital. Although key constraints remain (lack of financing, weak financial

management and technology governance, weak enabling environment, among others), supply and demand side actors are becoming increasingly aware of transformative potentials of PUE and are more willing to invest in modern energy technologies for productive uses. Demand and supply can benefit from tailor-made financial products and services for small scale PUE technologies with better access to higher tier productive activities, especially for women. To increase PUE in rural areas, knowledge exchange will be fostered with national programs.

EnDev 2021 programming cycle - Theory of Change for:				Electricity sector of Rural Bolivia								Intervention code:		EnDev managed		External with EnDev input			
<b>Energizing Lives - Social development</b> *Improved HH quality of life * Reduced vulnerability * Better learning environment * Allowing gender equality				<b>Energizing Opportunities. Economic Development</b> * Improved income from productive use of energy in MSME * Improved income of women from productive use of energy along selected value chains * Development of female share of contribution to household income								<b>Energizing Climate - Combating climate change</b> * Users climate change resilience strengthened							
Households and social institutions have access to affordable, reliable and modern energy				* Private sector and public actors continue investing to expand the provision and use of solar products										Private and public actors have gained access, knowledge and experience for productive uses					
A larger number of households are connected to national grid and micro-hydro power stations				A larger number of households, social infrastructures, and production units with access and use of SPV										MSME (men and women) has increased PUE in rural areas					
Technical and financing conditions are suitable for accessing electricity to rural areas				There is an emergent but potential market for SPV systems, nation wide, in rural and remote areas of Bolivia										MSME invest in modern energy technologies for productive uses					
Share of connection costs to be born by HH is reduced	Share of connection costs to be born by HH nearby micro-hydro power stations is reduced	Technical energy losses reduced and accurate billing of households electricity consumption in place	HH accessed to local safe internal connections and wiring services	Lessons-learned on Pre-Pay and Smart Metering shared/Share of connection costs to be born by HH is reduced	Increase awareness of the use of solar systems for lighting and productive uses ( ENERGETICA)	Increases knowledge of diverse options/models/ links with certified international suppliers of solar products	Suppliers acquired capacities, skills, attitudes and practices on tailor-made marketing strategies	Suppliers accessed to investment capital for developing new business models in rural and remote areas	Rural schools' SPV systems repaired and working	Lessons-learned and knowledge exchange with regional experiences	Share of connection costs to be born by HH connected to solar parks is reduced	Women entrepreneur with access to finance and business skills developed	Share of cost-intensive interventions aimed for agricultural and manufacturing needs	MSME accessed to operation and/or investment capital for developing new business models in rural and remote areas	MSME reached by newly introduced financial products for investment in needs-based, climate-friendly energy supply systems for PU	Innovative concepts replicated for the PUE in selected value chains	MSME acquired capacities, skills, attitudes and practices on tailor-made marketing strategies and PU technologies governance	Lessons-learned and knowledge exchange with regional experiences	
Demonstrating of economies of scale in equipment procurement	Replacement of old/malfunctioning electricity meters (short- to medium-term intervention)	Technical training of local technicians ( men and women) on safe internal house wiring	Learning agenda for electric sector on Pre Pay and Smart Metering/ material procurement for HH connection in government pilots	Marketing campaigns for SPV products and solar appliances	Learning agenda for diversification of product and portfolios for solar systems and appliances ( ENERGETICA)	Implementation of suppliers tailor-made marketing strategies	Continuing support through a financing mechanism (basket fund FASERTE)	Facilitation of alliances between private sector, financial mechanisms for SPV systems payment	Facilitation of alliances between private sector, municipalities and rural school committees/boards to rehabilitate broken down solarPV systems ( ENERGETICA)	Learning agenda with national ministries and national programs about trade or norms for SPV market growth	Demonstrating of economies of scale in equipment procurement	Women Fund:Fostering women's entrepreneurship for the productive use of electricity	Creating support through a financing mechanism adapted for higher tear access (basket fund FASERTE)	Expanding and anchoring long term sustainable PUE access for rural MSME (PRACTICAL ACTION )	Facilitating alliances between financial system and MSME	R+D+I for adaptive PU technology	Knowledge management, experiences exchange for government actors through national experts and institutions	Expanding knowledge sharing to PU private and public key actors	
Demand		Supply		Enabling environment		Demand		Supply		Enabling environment		Demand		Supply		Enabling environment			
Connection costs in rural and remote areas are high	Limited or no connections in communities nearby micro-hydro power stations	High technical energy losses and incorrect billing	Incomplete and/or unsafe internal house wiring in rural households	Pre-pay/smart metering systems in rural and remote areas are not developed	Awareness about SPV systems on end-users is limited	Low growth and diversification of SPV technology suppliers	SPV suppliers' market skills still under development	Suppliers have limited access to operation and capital investments	SPV systems installed by government programs are out of order	Certified SPV solutions are expensive at the end-user level/import and customs procedures are cumbersome, complicated and time consuming.	Solar park investments lack of resources for energy connections nearby.	Women limited access to high productivity activities and economic resources	Low growth and diversification of PU technology suppliers	Lack of access to operation and investment capital PU suppliers	Financial system with lack of experience and poor portfolio for PUE products	Scarce/no technical and financial advisory services applied to ongoing business models	A short term lifetime of PU technologies provided by the government	Intermediate technology is not prioritized in GOB policies and strategies	Lack of knowledge and experience in government key actors
Lack of public and private resources for expensive energy access and system maintenance				Solar rural market for lightning and productive uses requires private technical and financial support										Access to PUE in rural areas requires financial support and experienced technical advise					
Households lack capacity to pay connection fees	Low level of financial reserves to invest in repair, replacement and expansion of energy provision infrastructure.	Precarious internal wiring and electrical households connections	High logistic costs of reading electricity meters in rural and remote areas	Low level of awareness and information about SPV technologies and solar appliances in the market	Few SPV suppliers with limited rural market skills target markets	Lack of financial tools adapted to target consumers of rural areas	SPV installed by government programs at rural schools have not included training on O&M and financial support for repairs and replacements	Lack of legal framework or regulation that facilitate trade and importation of SPV solutions	Communities neighbored by solar parks do not benefit from connection of electricity access	Limited/no access/use to PU technologies for women's benefits	Scarce R+D+I about small-scale PU technologies	Lack of scalability of PU technologies at MSME level	Lack of tailor-made financial products and services for small scale PU technologies	Low/no profitability of economic activities	National Programs with weak financial management, governance and lack of technical experience withPU technologies	Low productivity and few qualitative changes in rural economic	Lack of sectoral measures to support the productive use of electricity		
Conection of the non electrificated areas is a slow and a very long-term process				The energy transition scenario demands strong support for solar systems market development										Productive use of energy in rural areas is limited					
<b>Higher tier electrification ( grid densification)</b>				<b>Market for SolarPV</b>										<b>Productive Uses of Energy</b>					
				The growth in access to modern energy services and products for households, MSME and social institutions in remote rural areas in Bolivia is growing slower than anticipated															

### 1.3.3 Transformative character

#### Higher tier electrification

##### **Market development**

EnDev provides utilities with part of the electric material used for household's connection, which allows for cost reductions for EnDev's target group, increasing the demand for the service. As for the supply side, EnDev supports the technical modernization for providers (replacement of old or broken equipment, smart and prepay meter systems) which improves the financial situation of rural electric cooperatives. With regards to materials and equipment, EnDev supports the production of meter boxes, encouraging quality production and ensuring durability according to the humidity conditions of the regions.

##### **Economic development**

Access to affordable, reliable, sustainable and modern energy through grid densification will expand economic opportunities for income generation. Replacing old/malfunctioning electricity meters, along with technical training to local (male and female) technicians on safe internal house wiring will reduce energy losses, improve safety and reduce vulnerability of households to potential accidents. In turn, this will increase willingness to pay and decrease risk of small rural electric cooperatives' bankruptcy due to default in bill payments, which would endanger energy provision for households and social institutions. High logistic costs of reading electricity meters in remote rural areas is also to be reduced by implementing smart metering as a pilot intervention in alliance with national ministries and utilities.

##### **Social development**

Access to modern energy improves the learning environment for children and allows households to buy home appliances, improving quality of life, reducing vulnerability and improving health. EnDev integrates support to the most dispersed rural electric cooperatives not served by the national government within its portfolio, allowing them to have access to quality electric material and share knowledge with all of them. The project strengthens women entrepreneurs from these cooperatives in strategic management of this rural enterprises. In a country with high percentages of domestic violence, EnDev incorporates messages to prevent violence against women and a telephone helpline on meter boxes installed in rural communities as well as in electricity bills.

##### **Poverty alleviation**

Access to modern energy will contribute to the multi-dimensional poverty alleviation of vulnerable communities in Bolivia. It will help children and youngsters with better learning conditions and afterschool studies. It will facilitate families to remote medical consultation and safer local health services (stable sources of electricity, vaccine cooling chain, etc.). It will allow new alternatives for income generation and/or complementary economic activities. It will improve habitability and comfort in households and safety in their communities. The replacement of old and broken meters is necessary in poor and vulnerable rural areas and former mining centres, which are currently in the extreme poverty gap.

## Solar market development

### Market development

Solar market development has been negatively impacted by the double crises of political unrest in 2019 and the COVID-19 pandemic in 2020. To prevent market deterioration and to reinvigorate previous market growth for the five companies offering quality certified products in the solarPV market, EnDev will strengthen both supply and demand and use this opportunity to diversify the market by integrating new smaller companies detected in rural areas. EnDev will strengthen solarPV suppliers to target rural markets by supporting them in developing, diversifying and qualifying business modalities and distribution channels through training, providing key networks and fostering public-private partnerships for businesses. This will promote further diversification of solarPV systems and complementary appliances to attract potential new consumers, promoting user awareness to increase willingness to pay, and to diversify experiences on solar technologies among potential customers. Reliable warranty schemes and after-sales services established in previous years will be further improved.

### Economic development

Based on a political mandate that requires the financial sector to promote rural productive development, EnDev has begun negotiations with two financial institutions that need support for designing and providing adequate credit products for productive technologies. Training and meetings to share experiences will be carried out to strengthen the financial sector with information and knowledge. Rural users with favorable profiles for accessing credits will be linked to these financial institutions. This will enable solarPV and productive technology suppliers to access new investment and operation capital needed for growth and expansion.

### Social development

The expansion of solarPV will improve the learning environment for children and allow home appliances to be bought by households, improving quality of life, reducing vulnerability and improving health. EnDev Bolivia's gender strategy puts special emphasis on capacity and skills development and direct support for women's initiatives in different areas related to energy (e.g. commercialization of solarPV products, entrepreneurship, technical training). This makes women visible as entrepreneurs and empowers them in communal and organizational decision-making related to local economic development.

### Poverty alleviation

EnDev has identified medium and large-sized solarPV systems installed by the government in rural schools, which are not used due to malfunction and unsafe electrical installations, leaving those SI without energy access. Scaling-up pilot SI rehabilitation experiences to schools and educational centres will improve access to basic social services in the most vulnerable and remote regions.

## Productive use of energy (PUE)

### Market development

In PUE, there is growing supply and demand for technologies and equipment. However, capacity building and technical assistance is needed for designing and co-designing technologies. In addition, business training, strengthening of value chains and adequate PU



technology use and governance will allow greater income generation, improvement of productive capabilities and access to market systems for rural MSME's. Helping to unleash these potentials is a major reason for EnDev's support to the economic development of PUE.

### **Economic development**

EnDev is closely aligned with national government policies, supporting local economic development through PUE in on-grid areas. Whilst EnDev in Bolivia already is one of the main contributors to global PUE targets, EnDev will further scale up higher-tier PUE promoting larger-scale machinery for agricultural production, agro-processing and other rural economic activities. By promoting greater access to higher tier PUE, EnDev will support improvement, viability and sustainability of rural economic activities, which mostly focus on agriculture. EnDev will conduct R+D+I for adaptive PU technology, meaning that needs-based design for equipment and machinery will promote growth and volume of primary and transformed agricultural production. These are directly related to additional and new income generation and cost reduction for MSME's as well as for productive organizations.

EnDev will not only continue supporting the implementation of electrical transformers, it will also keep contributing to diversify technologies (e.g. solar dehydrators, irrigation pumps, dewatering machines, mills) for rural productive activities, storage, processing and/or manufacturing activities. Furthermore, ongoing cooperation agreements with government programmes, national and international NGOs and foundations, and the financial sector will contribute to improving access to finance for PU technology suppliers and for MSME's to develop bankable business models.

### **Social development**

Self-managed economic activities and gender-inclusive modern energy technologies adapted to local contexts will ensure their long-term adoption, replication and scaling up. This makes women visible as income generators and empowers them in communal and organizational decision-making, regarding energy access and contributing to local and economic development. Women are empowered as inequities are reduced, becoming protagonists of their own development.

### **Poverty alleviation**

Special emphasis on capacity and skills development and direct support for women's initiatives in different areas related to productive uses of energy as part of EnDev's Gender Strategy, focuses on leaving no one behind.

## **1.3.4 Collaboration**

### **Sector alignment**

Being an energy access program with a market-based approach, EnDev faces a unique political and economic environment in Bolivia, which will continue for the next years given the October 2020 electoral results. The newly-appointed Vice-Ministry of Electricity and Alternative Energies will continue implementing programmes to achieve the objective of universal energy access by 2025 with funding from KfW, IADB and WB. The proposed activities support the government in reaching this objective in the areas of higher tier electrification. EnDev will work at the sectoral level to facilitate technical capacity building and knowledge exchange to promote

regulations for smart and pre-pay metering systems, an activity that has started last year in cooperation with the National Company of Electricity. EnDev will also support the national government in developing regulations for approval of picoPV systems and the promotion of a new range of solarPV appliances.

In cooperation with the Ministry for the Productive Development, EnDev supports public sectoral programs to expand PUE technologies through the exchange of experiences with national and regional experts, and training for technical staff from related government programs. EnDev is part of the “Energy Sub-Grus”, a coalition of all the International Cooperation Energy programs that work together under the lead of the Ministry of Energy. Although “Sub-Grus” focus on financial and technical cooperation on the energy matrix transition, EnDev has an important value proposition and can collaborate on topics regarding energy access.

### **Implementer base**

Given that many larger organizations and donors have pulled out from Bolivia, EnDev now plays a central role in connecting relevant partners such as public actors from national programs, regional institutions like [IICA](#), NGOs, development organizations, the private sector and civil society. EnDev thus facilitates the exchange of experiences among relevant stakeholders in the energy access sector.

In the on-grid sector the national electricity utility [ENDE](#), local electricity utilities and rural electricity cooperatives have the mandate and responsibility to provide the Bolivian people with electricity access. EnDev works closely with these institutions to boost higher tier connections in the most remote areas. EnDev will continue supporting these local actors, especially the dispersed rural electric cooperatives, by improving their managerial skills and technical expertise with the objective to improve their business case. Since 2020, ENDE is analysing the possibility to develop a pilot program for smart or pre-pay metering, which would allow significant reductions of the high logistic costs of reading electricity meters in remote areas. EnDev contributed with knowledge and experience exchanges with international experts. When the ENDE pilot is concluded, EnDev will provide the smart meters or electrical materials for the households’ connections.

For solar market development, EnDev works together with the private sector, NGOs and municipalities willing to collaborate on the acquisition of certified solar lighting products. EnDev is working to strengthen existing implementers and to broaden the implementer base of solarPV, particularly targeting remote areas. These companies are supported to implement their business plans for rural niche markets, offering Verasol certified products. EnDev acts as a facilitator to encourage business ecosystems and foster public-private partnerships. Activities will be strengthened in cooperation with a new implementing partner [ENERGETICA](#), a local NGO with years of experiences in solarPV for lighting and PUE.

As for PUE, EnDev has built a very strong nation-wide cooperation network of relevant partners with which EnDev signed agreements to complement efforts, technical expertise, and financial resources. These partners include government programmes like EMPODERAR, national NGOs and foundations that support agricultural projects and microfinance with rural MSME’s (led by women and men), international NGOs and foundations such as IICA (Interamerican Institute for Agriculture Cooperation) and [Agriterra](#) (funded by the Netherlands), which implement local development projects on agroecology and rural enterprise development.

EnDev's close alliance with [Practical Action](#) which was established a decade ago has become an important source of knowledge exchange and dissemination in the sector. Through this alliance, further support to rural producer associations in value chains such as coffee, cacao, honey, and others has been delivered. By bringing together EnDev's energy access expertise with Practical Action's knowledge in supporting producers' work along value chains, access to markets for rural productive associations is increasing.

### **Leverage / spin off**

EnDev supported IICA to establish the basket fund [FASERTe](#) (Fund for Sustainable Access to Renewable Energies and Efficient Technologies) which aims to boost Bolivia's renewable energy and efficient technologies market by supporting companies who import and commercialize RE technologies, namely solarPV products, improved portable stoves (mainly solar), and other RE technologies for households, social infrastructure and for productive uses of energy. The fund launched and concluded its 1<sup>st</sup> round in 2019. Companies receiving support had to leverage at least twice the amount they received (e.g. for each 1 EUR received, the company had to invest at least 2 EUR). The accomplished leverage was 4 to 1, thus exceeding original expectations. Due to the COVID-19 crisis and considering resulting risks, the ongoing 2<sup>nd</sup> round sets a minimum 1 to 1 leverage. However, it is expected to achieve similar proportions as compared to the first round. In addition, the access to finance for strengthening internal technical capabilities includes training for improving marketing and business strategies. To support market dynamization, national events such as (virtual) innovative trade fairs have been organized by FASERTe, with active participation of financial institutions presenting credit opportunities for rural activities.

FASERTe has supported activities mainly in the Altiplano and the lowlands regions where the participating companies operate. With 34% of promoted technologies being purchased by women, the fund encourages the participation and inclusion of women and youths. Although EnDev supports IICA to structure FASERTe and build up a track record, the medium-term strategy is to attract additional third-party funding (e.g. from the financial sector). EnDev backs these activities by organising meetings, presenting the fund to other donors and disseminating the results beyond the continuous knowledge and technical exchanges. A third round, with 5% of EnDev's new budget, is being planned to begin in the second semester of 2021, set to last until 2023. FASERTe will keep the same structure but will focus mainly on PUE for agricultural producers.

Besides FASERTE, every PUE project supported by EnDev is implemented under a form of co-financing and ensures financial leverage: On average, 50% of the investment costs are contributed by MSME's and productive organizations. A leverage minimum of 1 to 1 will also be applied for the proposed Women Fund for female entrepreneurs.

### **Nexuses**

The collaborative work to be carried out with allies and counterparts, especially in PUE, aims at supporting food production chains in the (semi-) arid Valleys, Yungas and Altiplano regions. Increased support for electrical and solar pumps' access is also a direct response to growing water needs for irrigation and human consumption in a country strongly affected by climate change. These tasks will be carried out with active involvement of municipalities and local institutions. EnDev also collaborates with other GIZ programs at a national level that focus on water, basin and watershed management, as well as forestry. The alliance with IICA, being

the main International Cooperation Institution for agriculture in Bolivia, connects EnDev to different actors and organizations related to agricultural, livestock and fishing production.

### 1.3.5 Modalities

#### Higher tier electrification

##### Approach and reason for the approach

Rural households have low energy consumption and income while operation costs for connections and electricity meter readings are high, making them unattractive clients for a grid-based electricity utility and discouraging the efforts needed to secure energy access for all. EnDev contributes with meters and electric material specifically adapted for each region, also providing transportation and delivery of these materials to rural cooperatives and electricity distributors, who are then in charge of implementing the projects. This approach reduces connection costs for families, while guaranteeing certified quality materials. The incentive has encouraged thousands of rural families to make the necessary efforts to connect to the grid with reduced costs, while allowing electricity distributors to effectively increase the number of connections. EnDev also carries out awareness campaigns to inform the population about the strategy and its benefits. This has been an effective and efficient approach (20 EUR per household strategy) since 2006 and is considered a significantly important component for supporting GoB's plan for universal coverage by 2025.

In 2020, EnDev started a learning agenda supporting the electric sector to gain knowledge and experience with modern smart and pre-pay metering systems facilitating exchange of lessons learned between national/regional experts and ENDE/rural cooperatives. The next step will be to support pilot projects of smart metering developed by the national government in rural areas.

##### Activities

- **Grid connections:** EnDev continues supporting rural electricity cooperatives in remote areas with technical assistance and electric material to connect new households to the grid, so the share of connection costs borne by households and social institutions are reduced.
- **Mini-grid neighbouring household connections:** EnDev will provide electric materials to the small local cooperatives organized by the municipalities in order to reduce households' connection costs for the rural communities living adjacent to these mini-grids.
- **Replacement of electricity meters:** Old and malfunctioning electricity meters (some over 40 years old) are being replaced with state-of-the-art meters to reduce technical and energy losses. The old equipment will be collected by the national utility.
- **Improvement of internal house wiring:** Technical training of local electricians (men and women) on safe in-house installations to ensure complete and safe wiring in households. To complete this task, ENDE and rural cooperatives will provide lists of candidates that belong to the electricity committees in the rural areas. Technical institutes such as [INFOCAL](#) (a foundation specialized in professional technical education and job training) will carry out one-week training sessions, which will be paid by EnDev and supported by ENDE. Technical training will also be provided in association with

[Habitat for Humanity Bolivia](#) as part of its development of technical and employability skills for women project for 250 women in populations of the Andean region.

- **Piloting smart and pre-pay metering:** The Vice-Ministry of Electricity and Alternative Energies and ENDE are considering the implementation of pilot projects for smart and pre-pay metering to be used in remote areas. In 2020, knowledge and experience exchange rounds with regional experts were facilitated by EnDev as part of the enabling environment objectives for the sector. Smart meters and electrical material can be provided for the households' connections once the pilot has been enabled. The last three activities were proposed in the 2019 programming round and had to be delayed due to the COVID-19 crisis which inhibited completing the planned activities.
- **Nonviolence against women message:** Cooperatives include messaging to prevent violence against women in electricity bills and in meter boxes installed in the households. These messages provide a secure phone number for denouncing male violence.

### **Effectiveness and Cost-efficiency**

Delivery of electrical material, meters and meter boxes to electricity distributors and cooperatives allows for a significant reduction in the cost that families must pay for the service. The measure is highly effective as it is an economic incentive for the grid connection and is well recognized by the national government for its positive effect on rural electrification projects. The purchase of large quantities of material allows an investment of less than 20 EUR per connected family. The work carried out in partnership with electric utilities and cooperatives contributes to logistics costs and material delivery.

## **Solar market development**

### **Approach and reason for the approach**

Since 2015, EnDev supports the solar market development and actively promotes the improvement of product warranties and after sales services for solarPV products. It works together with the private sector on supply side and with customers as well as public sector (municipalities and national government) on demand side. The off-grid sector will continue to be relevant because some remote rural areas will not be connected to the national grid in the medium- to long-term. EnDev will continue supporting the private sector by strengthening demand and enhancing penetration of rural markets and the implementation of suppliers' tailor-made marketing strategies. Furthermore, as a new approach, EnDev will link suppliers and users of solarPV solutions with banks and financial institutions. Furthermore, EnDev will increase knowledge and understanding of the use of solar systems for lighting and productive uses, and diversify suppliers' product portfolios of solar systems and appliances.

### **Activities**

- **Demand activation:** EnDev works with local municipalities and communities to increase awareness of available products and their use supporting suppliers with marketing strategies. EnDev will increase interest and awareness among consumers as an expanded portfolio of solarPV systems for lighting, PUE and home appliances will be promoted together with ENERGETICA. Initial investments to be made by the project will explore international markets with additional certified solar products that can be imported to Bolivia in order to inform and lead the way for existing and potential suppliers.

- **Strengthening private sector/supply side:** EnDev continues supporting solarPV suppliers in developing suitable business models and distribution channels. A business coaching program for companies and start-ups, as part of FASERTe, will contribute building capacities for distributing and selling quality products. EnDev also works to improve product warranty schemes.
- **Access to financing:** EnDev supports the development of financial products to increase affordability for households and MSME's by facilitating alliances between the private and financial sectors.
- **Fostering cooperation between public and private sector:** EnDev will continue to facilitate cooperation between solarPV suppliers and local municipalities in order to foster micro-franchise last-mile distribution models and bring the market offer to rural communities. The activities to be carried out include capacity building for fixed-point vendors (rural shops) or travelling vendors to work at the weekly rural fairs.
- **Solar parks household connections:** As in the case of mini grids, EnDev will provide electric materials to reduce households' connection costs to the small local cooperatives.
- **Rehabilitation of solarPV systems in rural schools:**  
In 2020, a study conducted by EnDev in 100 rural schools found that scaling-up pilot social institutions' rehabilitation experiences for schools and educational centers will improve access to basic social services in the most vulnerable and remote regions. Currently, solarPV systems are not functioning due to lack of batteries and poor connections, but the solar panels are still in place and in good conditions. EnDev will promote alliances between equipment suppliers and the municipalities for replacing batteries and improve electric connections. School parent's committees are also being involved for adequate care, operation and maintenance. EnDev will promote activities that can generate income to ensure replacement and maintenance funds such as movie projections on Sunday evenings, community gatherings and similar activities using the renewed energy access. Schoolboards and committees, which are traditional organizations in the Bolivian educational system and are in charge of overseeing and supporting children's education, will be strongly involved in the pilot project. If positive results are achieved, a strategy for replicating can be developed and proposed to other municipalities and to the Ministry of Energy, allowing more schools to benefit in the rest of the country.

Solar parks household connections and solarPV rehabilitation for rural schools were also part of the 2019 programming round; however, the COVID-19 crisis made it impossible to complete.

### **Effectiveness and Cost-efficiency**

EnDev's intervention in the development of the solar market faces greater challenges than the other components due to the politic and economic context of the country. From the demand point of view, EnDev has taken advantage of radio campaigns, a useful means to raise awareness about good quality products and warranty schemes from EnDev's partners different from the competing low-quality products. EnDev's partners work with municipalities with whom they share logistic costs for marketing and product delivery. Municipal alliances also make it possible to channel funds for the reactivation of rural schools' solarPV systems. The chosen approach allows supporting several initiatives at the same time: information for market



diversification, facilitating the intervention of the financial system, access to FASERTe - actions that will allow for greater impact and lower risk.

## Productive use of energy (PUE)

### Approach and reason for the approach

One of the objectives in the current proposal is to further strengthen and excel the PUE component by complementing EnDev's experience with the expertise of important actors (IICA, Practical Action and ENERGETICA) with which EnDev can achieve greater outreach. The intention is not only to take advantage of the interest in PUE in rural areas, but also because EnDev in Bolivia as the main contributor to global PUE targets aims to foster knowledge and experience exchange on PUE for the overall EnDev Global programme.

Through more cost-intensive key interventions targeting PUE or higher tier energy access, EnDev will provide support for overcoming low productivity and low or no profitability of agricultural and manufacturing economic activities. EnDev will link supply and demand of modern energy technologies with the financial sector, building capacities of MSME's, especially women entrepreneurs. To do so, EnDev combines two approaches: the approach solely implemented by EnDev and the other approach implemented in cooperation with EnDev's partners IICA, Practical Action and ENERGETICA. The latter approach includes the development of activities combining PUE, gender and innovation and seeking cooperation with the financial sector on different levels. The PUE projects to be supported will be chosen from those demanded by MSME's/associations willing to provide financial counterparts and to participate in training. Additional selection criteria will be established by FASERTe or Practical Action. Agricultural producers and producers from the forestry, fishery, cacao, coffee and honey sector more specifically are some of the identified groups that have already expressed interest in the project. Good quality and maximum value proposition of PU products for the consumers are ensured by working with the best technology providers nation-wide. EnDev's advisory role for acquiring certified equipment (when possible) and for overseeing design and assembly with experts is improving trust of rural producers, which may increase willingness to invest.

### Activities

- **Implementation of PU projects:** Aimed at higher tier energy access for agricultural, fishing and manufacturing (coffee and cacao chains, grain and horticultural production, extractive process of oils and essences for the cosmetic industry, water irrigation). EnDev provides technical assistance, linkages between supply and demand, training, support for technology design and economic incentives (20 EUR/producer). This reduces final technology costs for users.
- **Access to electrical transformers:** Support will continue in the provision of stable energy for produce processing facilities, especially for milk production as well as for PU equipment and machinery.
- **Evidence, learning transfer and innovation:** Documentation and analysis of lessons learned and knowledge sharing of regional experiences, with special focus on governmental programs.

Programming 2021 has the following new activities:



- **Linkage to financial sector:** Through an alliance with the BDP bank, tailor-made financial products and services for small scale PU technologies will be developed. Linking PU suppliers and MSME's to access operation and/or investment capital for developing bankable business models for users with borrowing capacity.
- **Women Fund:** Access to technologies for productive uses to MSME's led by women or led by men (the latter with at least 40% representation of women as staff). The financial window will be developed by EnDev through training for financial participation and business skills, such as getting the businesses registered, development of business plans and marketing. Women involved in the fund will be related to FASERTE in order to increase their chances of obtaining funding for successful business cases. The Women Fund will also provide a top up support to all those MSME's that were selected under FASERTE and are more gender-balanced.
- **Replication of PUE innovative concepts.** R+D+i on small-scale PU technologies in selected value chains. Also, innovative concepts will be replicated for female led supply businesses to develop new business plans for PU technologies such as solar dryers, grinders, milling machines and needs-based equipment for food processing.

### **Effectiveness and Cost-efficiency**

Over the years, EnDev's financial support to productive associations has followed a subsidy minimization criterion, varying from EUR 100 to the current EUR 20 per associate. Although limited, it is considered an economic incentive that encourages the associations to invest. They accompany the investment by completing the contribution of the technologies, which often represents more than 40% of the total cost of the equipment. EnDev strengthens its capacity through partnerships established with locally based counterparts (foundations, NGOs, large associations) with which it shares expenses (logistics/training), channels funds and exchanges knowledge, making EnDev's strategy highly cost efficient and effective due to the number of associations willing to participate. The intervention is characterized by a high level of technical advice with experience in the rural market, which also allows to link users with the best technology providers (more experienced, quality equipment, better materials, with warranty, installation and training capacity) with whom we work at national level. In recent years EnDev has focused its support in regions of valleys, yungas and altiplano where there is a lot of agricultural production.

### 1.3.6 Results

In total, EnDev will provide 608,454 people with access to modern energy with a special focus on access to higher tier energy through grid connections and productive use (a total of 19,768 MSME's supported). In this phase, little outreach is considered for SI and support for PUE is diversified at the national level. At least 40% of the PUE technologies are expected to be bought by women.

Project results	Absolute Targets (2010-2023)	Additional targets (2021-2023)
People: Access to Electricity	356,892	35,104
People: Access to Cooking	251,562	0
SI: Access to Electricity	1,181	34
SI: Access to Cooking	1,293	0
PU: Access to Electricity	19,424	6,770
PU: Access to Cooking	340	0

#### Other target dimensions/indicators:

Considering the described activities, EnDev has interest to include different indicators that can be organized by the M&E team:

- The share of additional customers reached by newly introduced solar appliances for household and productive use.
- The share of additional customers reached by newly introduced financial products for investment in needs-based, climate-friendly energy supply systems for household and productive use.
- New business plans for the distribution of needs-based, climate-friendly energy supply systems for consumption or productive use.
- Number of people trained on internal house wiring.
- Number of new technology design for PU together with producers and technology providers.
- Number of business plans developed by the communities and MSME's with EnDev technical assistance as part of a skills development process.

#### Expected impacts:

Energizing Lives - Social development	Energizing Opportunities. Economic Development	Energizing Climate - Combating climate change
<ul style="list-style-type: none"> <li>• Improved HH quality of live</li> <li>• Reduced vulnerability</li> <li>• Better learning environment</li> <li>• Enabling gender equality</li> </ul>	<ul style="list-style-type: none"> <li>• Improved income from productive use of energy in MSME's</li> <li>• Improved income of women from productive use of energy along selected value chains</li> <li>• Development of female share of contribution to household income</li> </ul>	<ul style="list-style-type: none"> <li>• Users climate change resilience strengthened</li> </ul>

### 1.3.7 Sustainability

#### Financial sustainability

To ensure business case viability, this proposal incorporates formal linking with the financial sector. Also, it is expected that FASERTe will be able to continue supporting renewable energy suppliers, based on IICA's management with different bilateral and multilateral sources. The strategies to continue access to PU energy correspond to the alliances with the Productive Development Bank (BDP) and the NGO Practical Action. With BDP, tailor-made financial tools for green solutions will be developed, channeling resources from the UN Green Climate Fund, with which BDP has entered advanced negotiations. The BDP resources can be applied for EnDev direct users and for FASERTe as well.

#### Institutional sustainability

The creation of FASERTe was conceived as the *main exit strategy* for EnDev in Bolivia. Since the beginning, EnDev's knowledge and experience with the sector and with technologies are continuously being transferred to the fund. Links with counterparts and allies are being supported and developed by EnDev. The goal is that FASERTe will continue supporting energy access and market development in rural areas after EnDev exits Bolivia, by gaining own recognition to continue the work done so far. EnDev is also transferring more specific capacities and knowledge to other local partners including M&E skills for field work that will reinforce their skills to participate in other cooperation projects and to be a potential subject for future financial support.

The good relationship between EnDev, rural electricity cooperatives, and the National Electrification Company (ENDE) has been established and cultivated for more than a decade and has enabled successful knowledge transfer and management capacities development for the poorest rural cooperatives.

#### Ecological sustainability

The expansion and diversification of electrical technologies and solarPV systems are aimed at increasing the replacement of technologies based on fossil energy. EnDev supports the replacement of 40+ years old/broken household electricity meters. The equipment will be collected by the national electric utility and together we are looking for recycling opportunities for these parts. SolarPV systems that formerly were introduced by government programs and are now non-functioning will be restored.

**E- waste:** solarPV is harmful to the environment and health if not correctly disposed of. EnDev works with the promotion of quality systems with warranties in order to reduce e-waste. A few initiatives proposed by young entrepreneurs are just beginning to work on this issue. All these initiatives are centered in urban areas, collecting old, disused or obsolete computers, cell-phones and home appliances. There are no known efforts or intentions of spreading these activities to rural areas. EnDev proposes a study to analyze possibilities for collecting and recycling solar equipment (photovoltaic panels, lamps) that were distributed to social institutions and households by government programs in past years. This study will allow to identify potential key actors and to explore possible future actions for EnDev in e-waste management. In addition, efforts will be made to exchange lessons learned with other EnDev countries that acquired experience in the matter.

### **Technological sustainability**

EnDev developed the capacities of local technicians (women and men) to carry out safe connection services in households in cooperation with vocational training institutes. EnDev is working with a pool of local manufacturers and suppliers of PU technologies, which enable small-scale economic activities. Companies have no resources/demand for testing their products or technologies. Innovative technologies are responsibly tested by EnDev; results are analyzed and replicated after a positive evaluation. EnDev will include information to increase awareness and understanding of the benefits and the importance of product and technology testing.

### **Social sustainability**

EnDev works for the social acceptance of new technologies that improve the quality of life for rural consumers. Awareness raising and overcoming prejudices about photovoltaics are part of the efforts to sensitize local communities. This aims at increasing the demand for the most expensive solar technologies that include warranty schemes and better quality (especially compared to abundant and cheap low-quality products). Women participation with access to technology, training and financial opportunities for income generation will also be addressed. In all cases the possibility to work with EnDev depends on the users' demand, their capacity for economic counterparties and willingness to actively participate. In the case of grid connections, the electric utilities receive the demand from the households and the access depends on the implemented grid extension projects in the regions. EnDev has no possibility to decide who gets connected.

## **1.3.8 Gender Strategy and Safeguards**

Since 2016, EnDev is carrying out activities that are built, organized and informed by a gender-based approach, which seek to actively involve women in EnDev's different technical areas of action. The Gender Analysis has identified that EnDev's activities are classified as GG1, based on the following background:

### **Gender Strategy**

EnDev is implementing a visible, concrete and measurable Gender Strategy in its areas of incidence:

- Strengthening women's economic-productive skills and capabilities.
- Sustained and permanent support in combating violence against women.
- Technical training processes support the transformation of labor roles traditionally assigned to women. This includes: (a) empowerment and leadership skills. (b) finance facilitation. (c) strengthening of business skills.
- Advocacy within counterparts and allied institutions for positioning the issue of gender and raising awareness.

## Concrete measures established within the Gender Strategy:

	WOMEN'S NEEDS		
	PRACTICAL	PRODUCTIVE	STRATEGIC
<b>PRODUCTIVE USES OF ENERGY</b>		<p>Access to machinery for productive uses (solar dryers, mills, cooling tanks, etc.) to improve income, whilst reducing time and effort.</p> <p>Training workshops on the use and maintenance of technologies with different groups of men and women.</p> <p>Access to PUE equipment for women being members of associations.</p> <p>Strengthening women entrepreneurs in strategic management of rural enterprises.</p>	<p>Preferential (technical and financial) support to producer associations with female leadership.</p> <p>Involving associations of women entrepreneurs in the design of projects and specific technologies according to their needs.</p> <p>Business skills training such as business plans development, marketing, basic financial literacy, understanding bank requirements.</p>
<b>HIGHER TIER ELECTRIFICATION</b>	<p>Access to electricity for lighting, improved security, extended hours in the evening and morning.</p> <p>Improved safety/health due to safe in-house wiring</p>		<p>Sensitizing society for denaturalizing gender-based violence against women.</p> <p>Cooperatives include messaging and hotline numbers for denouncing against male violence in electricity bills.</p> <p>Training and exchange of experiences for women in managerial positions in Rural Cooperatives.</p> <p>Supporting with free and safe childcare during training workshops for women.</p>
<b>MARKET DEVELOPMENT</b>			<p>Strengthening of business and sales skills of women vendors of solarPV systems and micro franchises, including the purchase of demonstrative equipment and tools for their use.</p>


## Concrete measures to ensure that the Project “does no harm”:

- Increasing training spaces and events for the EnDev team on gender-related topics.
- Strengthening the Gender Focal Point through expert advisory supporting the construction of methodologies, techniques and strategies to address gender issues on the diverse contexts in which the project team carries out its work (Gender Focal Point is a team member appointed to participate in the GIZ Gender and Interculturality Group, who is in greater contact with the Gender measures established by GIZ headquarters).
- Sociocultural diagnoses are carefully considered and informed by the gender approach, focused on the contexts of intervention.
- Gender Focal Point continuously doing follow-ups to EnDev’s implementing activities considering the follow indicators that will be reported:
  - The share of women-led businesses empowered to make investment decisions for needs-based, climate-friendly energy supply for household or productive use.
  - Number of women enterprises accessing loans from the Women's Fund.

- The share of additional equipment designed in alliance between women entrepreneurs and PU equipment providers in needs-based, climate-friendly energy supply systems for productive use.
- Number of cooperatives that include messaging and hotline number for denouncing male violence in electric bills.
- Number of supported producers' associations with female leadership.

# 1.4 Burundi

## 1.4.1 Summary and key data

<p><b>Promoted technologies</b></p>  <p><b>Summary of proposed interventions(s)</b></p>	<p>For the Burundi Programming 2021-2023 EnDev Management (GIZ &amp; RVO) and AVSI agreed on scaling-up vertically and horizontally the current GIZ market driven approach toward the promotion of a sustainable market for cleaner cooking solutions primarily targeting HHs in rural areas (potentially all provinces excluding Bujumbura Mairie). Considering the limited budget and the country several vulnerabilities, the priority focus will be on strengthening the value chain of the <i>Biikitigi</i> clay ICS (introduced in the country by GIZ in 2017) by:</p> <p><b>Training, BDS + Partnerships and alliances</b></p> <ul style="list-style-type: none"> <li>Increasing number, assets and skills of local producers through technical and business management training and coaching, supporting productivity improvement and collaborating with other programs (WB and EU);</li> <li>Improving/Granting ICSs quality and performances through technical assistance, quality system control and labelling that is still at its early stage of introduction by GIZ to increase ICS visibility and fight against stoves that are proposed as ICSs but that do not comply with minimal requirements (i.e. 40% fuel savings compared to the baseline in case of firewood) possibly involving also producers supported by other programs (EU, WB) and NGOs.</li> <li>Enhancing distribution channels and productive use (restaurants) through TA on model development, marketing and sales;</li> </ul> <p><b>Evidence, learning transfer, innovation</b></p> <ul style="list-style-type: none"> <li>Increasing awareness through demand activation initiatives and behaviour change campaigns especially stimulating the perception of ICS convenience (based on knowledge and innovations acquired through the EnDev Learning and Innovation Agenda – Clean cooking behavioural change);</li> <li>Addressing gender barriers to improve women ability to participate in the sector (trainings, access to finance) but also to explore women critical role in increasing awareness and generating demand for clean cooking solutions, partly as a result of their networks and community relationships;</li> </ul> <p><b>Access to Finance</b></p> <ul style="list-style-type: none"> <li>Promoting ICSs affordability through value chain vertical integration, sales increase (economies of scale) and efficiencies promotion and through access to finance leaning on existing initiatives (savings groups, farmers/HHs associations, women associations etc.) on rural areas and especially targeting women;</li> </ul> <p><b>Policy advice and capacity development</b></p> <ul style="list-style-type: none"> <li>Enabling environment through the TA to government, local authorities (when possible, requested or allowed by the GoB) and local CSOs and through coordinated activities with the sector’s main donors (EU, WB, WFP)</li> </ul>		
	<p><b>Quantitative targets</b> [# of]</p>		<p><b>Further relevant impacts/outcomes</b></p>
<p><b>Cooking / thermal energy for households</b></p>	<p>10,958<sup>10</sup></p>	<p>People</p>	<ul style="list-style-type: none"> <li>30% of the total ICSs will be sold to WFP and benefit refugees and extremely vulnerable households</li> <li>At least 8 additional MSMEs engaged in local ICSs (Biikitigi stove) production</li> <li>+20% (M), +50% (W) enrolled in the Biikitigi stove value chain</li> </ul>
<p><b>Project period</b></p>	<p>01.07.2021 – 31.12.2023</p>	<p><b>Indicative Budget</b></p>	<p>€ 568.557,00<sup>11</sup></p>

<sup>10</sup> Additional target achievement between 01.01.- 30.06.2021 will still be in GIZ’s responsibility and is thus not part of this proposal covering the period from 01.07.2021 – 31.12.2023 when AVSI will take over the responsibility for implementing the project in Burundi

<sup>11</sup> Excl. 10% GIZ overhead



## 1.4.2 Theory of change (ToC) and state of market

See Graph below

According to a study realized by the World Bank in 2020: access to electricity and clean cooking technologies in Burundi is extremely low (only 9% of Burundians have access to electricity nationwide but the rate reached 2% in some provinces). Approximately 90% of rural households (including rural villages and small cities outside Bujumbura Mairie) rely on traditional three-stone stoves, while almost 99% of households use solid fuels as the primary fuel for cooking. There has been almost no change in the fuel mix since 2010, with nearly 80% nationwide relying on wood. Outside of Bujumbura Mairie, where charcoal is the main source of cooking fuel, there is limited regional variation. In the last three years, approximately 60.000 to 80.000 improved cook stoves have been distributed to households by programs funded by Energizing Development (EnDev), the European Union (EU) and World Food Program (WFP). The total penetration of quality-verified improved cook stoves (ICSs) is estimated at less than 2% of the population.<sup>12</sup>

An estimated 71.7% of the population lives below the poverty line of US\$ 1.90 per day, so purchasing power for improved cook stoves is very limited. The political crisis of 2015, the persistent legal and fiscal restrictions and the foreign exchange difficulties make imports of higher tier mass production stoves, solar and electric products, very challenging. On the other hand, a widespread availability of high-quality clay and an abundance of local brick and tile makers, provided and provide opportunities for local production of affordable improved ceramic cook stoves. This is also the reason why the most popular ICS is, by far, the *Biikitigi* (Matawi) clay stove which has a market price of around €2,00 and is produced by 8 active local producers/artisans (only 5 of them produce more than 100 ICSs per month) trained and supported by EnDev.

For the 20% of households who currently purchase firewood, switching to an ICS could deliver annual fuel savings of approximately €13,00<sup>13</sup>. Nevertheless, for the remaining 80% of households who do not pay for firewood, ICS adoption is less convenient because the consequent time savings may not be immediately converted into direct financial savings or additional income generation due to relatively high underemployment and subsistence farming. Furthermore, rural households are still not aware about the potential benefits from these ICSs and only a nascent supply chain is tailoring its services to these customers.

For the period 2021-2023, considering the limited budget available and the country situation (financial, social, institutional and political vulnerability) described above, EnDev Management and AVSI agreed on **scaling-up vertically and horizontally the current GIZ approach. The priority focus will be on strengthening the value chain and the market driven distribution of the *Biikitigi* clay ICS** by:

- (i) Increasing number, assets and skills of local producers especially in the South of Burundi (availability) through technical and business management training and coaching, supporting productivity improvement and collaborating with other programs (WB and EU);

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<sup>12</sup> Burundi Market Assessment for Off Grid Solar and Improved Cooking Technologies for Households - The World Bank, May 2020

<sup>13</sup> Ibidem

- (ii) Improving/Granting ICSs quality and performances through technical assistance, quality system control and labelling that is still at its early stage of introduction by GIZ to increase ICS visibility and fight against stoves that are proposed as ICSs but that do not comply with minimal requirements (i.e. 40% fuel savings compared to the baseline in case of firewood) possibly involving also producers supported by other programs (UE, WB) and NGOs.
- (iii) Enhancing distribution channels and productive use (restaurants) through TA on model development, marketing and sales;
- (iv) Increasing awareness through demand activation initiatives and behaviour change campaigns especially stimulating the perception of ICS convenience;
- (v) Addressing gender barriers to improve women ability to participate in the sector (trainings, access to finance) but also to explore women critical role in increasing awareness and generating demand for clean cooking solutions, partly as a result of their networks and community relationships;
- (vi) Promoting ICSs affordability through value chain vertical integration, sales increase (economies of scale) and efficiencies promotion and through access to finance leaning on existing initiatives (savings groups, farmers/HHs associations, women associations etc.) on rural areas and especially targeting women;
- (vii) Enabling environment through the TA to government, local authorities (If possible, allowed and requested by the GoB) and local CSOs and through coordinated activities with the sector's main donors (EU, WB, WFP).

The project's main target group will be rural households (i.e. HHs living in countryside, small villages and cities outside Bujumbura Mairie = Burundi rural areas), starting from the districts where GIZ-EnDev and EU funded projects have already enabled local ICSs producers and coordinating with other main donors to address rural areas still not reached by any ICSs value chain enabling activities.

These are the impacts that may be expected:





- Contribution to increase HHs purchase power for basic needs thanks to the savings (money and time that could be dedicated to income generating activities) granted by ICSs adoption
- Improved health (women, children) thanks to the reduced harmful emissions for families that newly adopted an ICS and main cooking technology.
- Improved gender equality thanks to women enrolment into the ICS value chain and increased role in HH decision making process toward the adoption of an ICS.
- Increase sustainable consumption thanks to awareness raising activities, especially concerning cooking fuels (reduced by the adoption of an ICS)
- Increased MSEs productivity and profitability through all the interventions foresaw to strengthen the ICSs value chain.
- Increased job creation, technical and business skills

## **Covid-19**

Due to Burundi vulnerable context, Covid-19 has not been perceived as the main risk until now. In particular, in rural areas there were almost no changes in the normal lifestyle. Field activities has never been interrupted. Obviously, its outbreak can impact on activities implementation and for that reason a warning has been placed in the assumptions' section. AVSI staff is complying and will comply with the restrictions and guidelines established by the GoB and the

internal Health & Safety policies (protections, internal and communities' meetings, HHs visit, personal care, etc.). If a lockdown or a travel ban will be established, activities implementation will be affected (field work, missions by external consultant, ICSs production and sales etc.) although procedures are in place to mitigate all these impacts (smart working, digital communication, field offices activation etc.).

## Theory of Change - EnDev [BURUNDI - COOKING]

<b>Impacts</b>	<b>Energising Lives - Social development</b> <ul style="list-style-type: none"> <li>- Increased HHs purchase power for basic needs other than cooking fuels</li> <li>- Improved health (women, children)</li> <li>- Improved gender equality</li> <li>- Increase sustainable consumption</li> </ul> 	<b>Energising Opportunities - Economic development</b> <ul style="list-style-type: none"> <li>- Increased MSEs productivity and profitability;</li> <li>- Increased job creation, technical and business skills</li> </ul> 	<b>Energising Climate - Combating climate change</b> <ul style="list-style-type: none"> <li>- Reduced GHG emissions</li> <li>- Reduced forests degradation</li> <li>- Improve climate change awareness</li> </ul> 
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>- Producers and distributors continue to expand their ICSs business;</li> <li>- HHs purchase good quality ICS and replace worn-out ones with new ICSs</li> </ul>		
<b>Outcome</b>	Increased ICSs adoption rate by households across a larger area in rural Burundi (outside Bujumbura Mairie) 		
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>- HHs and businesses buy or invest in cleaner cooking solutions;</li> <li>- No pandemic major outbreak, no major political, financial or institutional instability or security problems;</li> <li>- Supportive or neutral attitude by government and local authorities vis-à-vis the ICSs market and NGOs operations</li> <li>- ICSs producers and distributors respect all fiscal, legal and human rights frameworks (including child labour)</li> <li>- Current GIZ-EnDev key staff continue to collaborate to EnDev project through AVSI.</li> <li>- Government and agencies (e.g. WB) allow AVSI to provide EnDev contribution in term of enabling environment</li> <li>- AVSI's smooth take over from GIZ</li> <li>- WFP and other agencies continue to buy from EnDev producers the Biikitigi stove to be distributed to refugees and extremely vulnerable HHs.</li> </ul>		
<b>Outputs and results</b>	<ul style="list-style-type: none"> <li>- Increased local production capacity, availability and visibility of quality ICSs (horizontal and vertical scaling)</li> <li>- Improved consumers awareness and increased demand for cleaner cooking solutions</li> <li>- Increased women's enrolment into the ICSs value chain and participation toward ICS adoption by HHs</li> </ul>		
<b>Key interventions</b>	<b>Enhancing supply-chain</b> <p>New producers start-up promotion and strongest existing producers strengthening through:</p> <ul style="list-style-type: none"> <li>- Dissemination of ICSs quality control system (labelling) introduced by GIZ in 2020</li> <li>- Technical/business training also promoting women enrolment</li> <li>- Result based support for production (equipment and material)</li> <li>- Distribution channels and logistics enablement</li> <li>- Improved marketing approach / tools</li> </ul>	<b>Demand activation and development</b> <ul style="list-style-type: none"> <li>- Massive awareness raising campaigns including the promotion of ICS convenience among families that collect firewood for free and also targeting women enrolment into the messages dissemination and promoting women involvement into the HH decision making process.</li> <li>- Support HHs access to credit and affordability</li> </ul>	<b>Partnership and synergies</b> <ul style="list-style-type: none"> <li>- Multi-stakeholder collaboration, sharing lessons learnt and technical knowledge with new programs (WB) and exploring synergies with main Energy programs (WB, EU, WFP) to scale up vertically and horizontally the current ICSs market.</li> <li>- Strengthening local authorities' awareness and capacity through TA when possible and requested</li> <li>- Targeting humanitarian settlements by supporting producers to supply ICSs to WFP that will distribute them to refugees</li> <li>- Training AVSI's (and possibly other actors) staff from other sectors concerning clean cooking benefits and behaviour change triggers</li> </ul>
<b>Barriers</b>	<b>Supply side barriers</b> <ul style="list-style-type: none"> <li>- Limited entrepreneurial and business management skills;</li> <li>- Limited scalable business models;</li> <li>- Poor profit margins granted by current ICSs market especially linked with the limited quantities produced and sold;</li> <li>- Poor technical skills;</li> <li>- Poor marketing approach and skills;</li> <li>- Poorly organized and mechanized production processes;</li> <li>- Low and/or not marketable product/service innovations;</li> <li>- Very limited access to credit;</li> <li>- Arduous and expensive goods' transportation</li> </ul>	<b>Demand side barriers</b> <ul style="list-style-type: none"> <li>- Behaviour change resistance due to traditional cooking habits, uninformed risks and benefits evaluation, availability of free firewood, lack of awareness and low education levels;</li> <li>- Very limited purchasing power and savings attitude by low income HHs;</li> <li>- Daily driven expenditures by HHs;</li> <li>- Very limited access to credit;</li> <li>- Arduous and time-wasting people mobility towards ICSs point of sales.</li> </ul>	<b>Enabling environment barriers</b> <ul style="list-style-type: none"> <li>- Poor policy framework;</li> <li>- No standards for improved cook stoves and clean cooking;</li> <li>- Unclear fiscal framework;</li> <li>- Difficulties in procuring quality services, machineries, tools and raw materials on local and external markets;</li> <li>- Difficulties in products, services and people mobility due to social instability, insecurity, pandemics, poor transport services and infrastructures.</li> </ul>
<b>Assumptions</b>	Current private sector strategies, technical and financial capacities do not permit the fast development of the local production and the widespread dissemination (including massive awareness raising and promotional campaigns) of ICSs solutions among households.		
<b>Root cause</b>	<ul style="list-style-type: none"> <li>- Poor quality, availability and visibility of improved cook stoves (ICSs) due to the limited number of local producers, their limited production and distribution capacity;</li> <li>- Poor awareness and perception among HHs concerning the risks associated to traditional cooking methods and the benefits of cleaner cooking solutions.</li> <li>- Very low daily income levels of the large majority of the population</li> </ul>		
<b>Core problem</b>	The large majority of households in Burundi still rely on firewood (80% nationwide, 90% in rural areas) and charcoal as cooking fuels contributing to greenhouse gas emissions, deforestation and respiratory diseases especially for women and children		

### 1.4.3 Transformative character

#### Market development

To date, the ICSs value chain is still at a nascent stage in Burundi. The proposed intervention will continue to sustainably increase ICSs availability, awareness, acceptability and convenience by improving and disseminating best practices, technology, knowledge and expertise around ICSs sector on providers (producers and distributors) and consumers' side. In doing that, the proposal will benefit (i.e. Project cost savings) from instruments recently (2020) developed by GIZ staff and still not completely disseminated (Biikitigi stove label, financial literacy manual, ICSs marketing guide for sales promoters, marketing kits, etc.). By engaging stakeholders (private companies, local authorities, communities), the project aim at increasing knowledge of the ICSs market's potential and its economic (but also environmental and social) relevance. By collaborating with other program (especially WB) the project will also try to contribute to enabling the environment for ICSs business. EnDev could support Burundi government in term of quality standard (labelling), behaviour change campaigns, ICSs value chain strengthening (vertical and horizontal upscale) and, in general, in term of elaboration of a clean cooking national development plan (still not existing).

#### Economic development

The increased ICSs production and distribution require new human capacitation, raw materials, services and equipment contributing directly to the local economic development. The strengthened ICSs value chain (e.g. new and reinforced producers) will generate new jobs also for women and youths without qualification and will provide them with an expertise (training) on ICSs production and promotion/sales. Moreover, by using the *Biikitigi* stove that is certified to save at least 40% of firewood (compared to the most used cooking method, the three-fire-stones), HHs can save time (e.g. dedicated to firewood collection) and fuel expenditures (families that buy firewood) and can eventually invest these savings for strengthening or starting up business activities (=> Income generation activities). This last impact can be reasonably assumed but cannot be directly linked to project activities and measured.

#### Social Development

The increased adoption of ICS by HHs will lead to social development in relation to health (reduced indoor air pollution, although limited with low tiers firewood ICSs), gender related issues (reduced time in cooking and collecting work, involvement of women and women's groups in ICS related activities - i.e. production, distribution, promotion and sales). Reducing firewood or charcoal consumption, may also reduce the risk of confrontation between different communities (e.g. refugees and host communities) and families concerning the exploitation of the limited natural resources (forests and trees). This last impact can be reasonably assumed but cannot be directly linked to project activities and measured.

#### Poverty alleviation

ICS adoption will enable households to save at least 40% of the cooking fuel per month. ICS will also create economic and employment opportunities along the value chain (see above). Finally, synergies with current WFP interventions will impact humanitarian settings and refugees (e.g. *Biikitigi* stove producers support and quality control on WFP purchase orders).

## 1.4.4 Collaboration

### Sector alignment

The government committed itself to expand population's access to modern energy services. Both, the *Burundi's Vision 2025* (five-year National Development Plan) and the *2011 Energy Policy Letter* emphasise that energy access is a key national priority and generically prioritize capacity building, production, and dissemination of improved cook stoves. However, there is still no specific target or implementation plan for improved cook stoves. Sector development plans are currently being created to implement the National development plan (Plan National de Développement or PND) and are expected to include a defined role for off-grid energy technologies<sup>14</sup>. EnDev/AVSI will try to collaborate with WB program (other donors have experienced some difficulties in dealing with the GoB although relationship are improving with the new government) to contribute to this planning process bringing, in particular, its expertise in quality control, behavioural change campaigns, ICS value chain strengthening and its field (rural HHs and communities) knowledge.

### Implementer base

EnDev will collaborate with The World Bank program that, in its preliminary study (May 2020), stated that its “*interventions will need to coordinate and be harmonized with other ongoing programs, notably those implemented by EnDev and through EU-funded projects. Key organizations include AVSI, which oversees the EU-funded program and is responsible for avoiding overlapping of activities with other donors and initiatives active in the country.*”<sup>15</sup> Coordination efforts could concern the identification of reputable local ICS producers who can be targeted to scale up production, the identification of the provinces and communes with low ICSs penetration, and the alignment of technical assistance and advocacy efforts for quality standards (labelling). Coordination will also be necessary to strictly avoid overlapping and double counting. On the other side, WB program will address some barriers that EnDev will not be able to address for budget limitations, i.e. “Limited access to and high cost of finance” for supply chain and “limited access to consumer finance”<sup>16</sup>.

Coordination and synergies with the EU funded interventions are already granted by AVSI's role of “EU energy program facilitator”. For example, in order to achieve EU program's ICSs dissemination targets in rural areas, all the three implementing consortia were proposed to focus on the EnDev *Biikitigi* stove through a market driven approach inspired by the current EnDev approach. Starting from July 2021, AVSI could also be able to provide quality control services to the consortia through current GIZ-EnDev staff.

AVSI will continue supporting credited producers to supply *Biikitigi* ICS to the World Food Program (WFP) for humanitarian settings and training the field officers from *Familles pour vaincre le Sida* (FVS - Families to stop AIDS). FVS field officers perform awareness campaigns at households' levels (with a special focus on women) and promote the adoption of cleaner and safer cooking methods. Eventually, families are suggested to buy an ICS (e.g. *Biikitigi* stove). Another important partnership could be established with the American NGO One Acre Fund (OAF) that support rural households by distributing some basic assets as agricultural tools,

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<sup>14</sup> *Burundi Market Assessment for Off Grid Solar and Improved Cooking Technologies for Households* - The World Bank, May 2020. Page 8.

<sup>15</sup> *Ibidem*. page 88.

<sup>16</sup> *Ibidem*, page 75 and 85

seeds and an ICS that they could possibly buy from GIZ-EnDev trained suppliers. EnDev could also train OAF trainers. At the moment, this collaboration is under discussion between GIZ-EnDev and OAF and, in case, it will be implemented by AVSI under the EnDev project umbrella starting from July 2021.

Within the budget and framework of the chain strengthening and enabling environment activities, EnDev could provide on demand technical assistance to other NGOs that aim at starting up ICS dissemination interventions: sharing best practices, approaches, instruments and, if staff and budget permit, also technical training on ICS production and quality control. Synergies will be created with other AVSI (EU funded) projects that are fighting against GBV. These interventions are improving community savings groups financial management skills and promoting women participation. EnDev will target these groups for a dedicated cooking behaviour change campaign, especially targeting women.

### **Leverage**

By supporting existing and new market players in developing a quality offer, wider distribution channels, effective models of awareness creation, product marketing and distribution, but also by disseminating market assessment, valuable proof of concept and by increasing public awareness about ICSs (demand activation), EnDev will continue to create conditions that are more favourable for new players (producers/distributors) investing in the ICSs sector. Moreover, consumers will be supported in increasing savings and awareness of cooking fuel impacts driving them to access to higher tier ICSs or modern and cleaner cooking solutions that will be possibly piloted in a future EnDev programming cycle or by other donors. There are a number of humanitarian settings focus programs (e.g. WFP, ref. previous paragraph) in Burundi, which might be interested in supporting activities in ICS. EnDev will facilitate their connections with the producers/distributors of the labelled *Biikitigi* stove.

### **Nexuses**

The program will operate in synergy with existing AVSI projects (nutrition education and child protection targeting vulnerable HHs; job creation for youth; fighting GBV in rural and urban areas; rural development including agriculture and livestock) that can be exploited both as awareness raising and sales channel. AVSI staff from other projects will be trained on ICS benefits and basic behaviour change communication skills by EnDev project staff.

Links could also be created with other EU funded consortia that are implementing interventions in the food security and health sectors (under the umbrella of the project “*Mesures de résilience pour la population burundaise*”). EnDev could start by simply informing their staff about ICSs producers/distributors’ locations, ICS benefits and basic behaviour change triggers.

Once tested through these simple technical/trainings contributions, if proven in term of ICSs dissemination potential, a deeper EnDev engagement in exploring these nexuses would require a budget revision or additional funds.



## 1.4.5 Modalities

### Approach

In 2021-2023 EnDev will focus on one priority sector (cooking), model (the *Biikitigi* stove) and on (rural) areas in order to reinforce the current project infrastructure and demonstrate the potential and viability of its support in view of a future upgrade toward clean cooking higher tiers and other energy components.

Building on current GIZ-EnDev approach and instruments, the proposed intervention will focus on strengthening (horizontally and vertically) ICSs value chain and on increasing consumers' demand. EnDev will support and improve the operations of the current main (for ICSs produced and sold) producers and distributors especially through technical assistance. At the same time, in coordination with other program (EU and WB see previous chapter), 10 new producers will be supported (encouraging women entrepreneurship and giving them priority in terms of support) and trained in areas where ICS market is still not existent or extremely underdeveloped. A strong effort will be produced on ICSs marketing, awareness raising and behaviour change campaigns to address the lack of convenience perception (i.e. the main barrier for 80% of the rural HHs that collect firewood for free). Communication and behaviour change initiative will also be designed to target women in order to explore their critical role in increasing awareness and generating demand for clean cooking solutions.

The chosen technology is the Matawi (*Biikitigi*) stove that was developed by EnDev-Tanzania in 2013 and introduced by EnDev-Burundi in 2017 due to technical problems related to the previous ICS model (Kamaro). *Biikitigi* stove, especially in its full-clay version, demonstrated to be most adapted to the Burundian context, especially due to the affordability limitation (barrier) and the local content aspects which makes it independent from imported material (barrier). According to different tests realized by EnDev Tanzania and Kenya, the *Biikitigi* stove in clay (ceramic) can save from 46% to 54% fuel (firewood) compared to the baseline (three-fire-stone). In 2020, EnDev promoted the sales of 28.131 units of *Biikitigi* stove (6.691 of which to WFP and other agencies/NGOs) through 12 producers, 8 of which can be considered regularly producing, and only 5 of which produce over 100 ICSs per month. In 2019, the units sold were 19.998. Finally, *Biikitigi* stove owns also the advantage that it can be used with both, firewood and charcoal (30% fuel savings compared to the baseline).

### Activities

Based on the approach described above, the following key activities will be implemented:

#### Market assessment

- *Consumer behaviour assessment.* The study will (i) investigate the ultimate barriers and drivers (enables) toward the adoption of *Biikitigi* stove by rural HHs; (ii) suggest strategies and instruments to address the barriers and to exploit drivers; (iii) highlight gender aspects and modalities to integrate them within the overall project implementation but especially into the awareness raising and behaviour change initiatives.

#### Support to producers / supply side

- *Provide (8) existing and (8) new producers with adequate technology and skills to produce cost-effective and quality Biikitigi stove.* This activity will be implemented accordingly with EnDev BDS principles and will include: (performance based) supports for the

procurement of quality equipment and tools to at least 10 producers/MSEs (8 new/star-up and 2 existing); (performance based) support for building or improving production facilities; ICS production improvement, standardization, *Biikitigi* labelling and quality system control (recently implemented by GIZ) through a randomized periodical test of *Biikitigi* stove specifications and resistance per each producers; production process re-organization and costs saving interventions; technical training for *Biikitigi* stove production; training on soft skills, financial literature (a manual is under elaboration by GIZ-EnDev Burundi) and basic business management; TA (coaching) for business plan elaboration and monitoring.

Considering the limited budget available, very simple performance base schemes will be tailored on each producer assigning specific targets in terms of units sold and/or ICS quality and/or productivity.

If possible, producers will be supported (TA by EnDev staff) in producing and distributing cooking solutions for social institutions and restaurants.

Specific supports will be granted to increase women engagement in the whole value chain (e.g. addressing mobility and childcare during training, giving priority to women-led enterprises or to the enterprises that employ the highest percentage of women, in case of start-up support to a new *Biikitigi* stove producer).

- *Provide existing and new producers and distributors (wholesales, point of sales, retailers) with marketing tools, sales trainings and business management skills, to improve their distribution capacity.* This activity will target at least 10 producers and 10 distributors and includes: the prospection of new sales channels; TA for the elaboration of business plan; TA to improve distribution/sales organization; Training on Adv, promotion and marketing techniques also benefitting from the Marketing guide under elaboration by GIZ-EnDev Burundi; distribution of the marketing kit and the *Biikitigi* “branding material” recently developed by GIZ-EnDev Burundi; improvement of logistic and transportation management. As per AVSI experience, women have always produced better results in terms of sales and ICSs promotion, the project will make every possible effort to support women involvement in this component.

#### Support to demand side

- *Awareness raising campaigns on ICSs/clean cooking benefits and behaviour change promotion.* This activity will be shaped by the results of the Consumer behaviour assessment and will include communities’ mobilization, events in schools, awareness raising meetings at community level; demonstrations; radio campaigns; road shows (theatre, music, and dance); training of other projects/partners staff; and door-to-door ICSs promotion; dissemination of *Biikitigi* stove instructions brochure to promote its safe, efficient and sustained use. ICSs producers and distributors will be involved in the conception and implementation of the campaigns that, in particular, will have to enable HHs perception on ICSs convenience. As gender plays a significant role in the adoption of ICSs, gender specific interventions should target both women and men and, when possible, facilitate an increased participation by women in the decision-making process.
- *Affordability’s support.* Considering the budget limitation and the relatively partial extend of the unaffordability barrier for *Biikitigi* stove (2-4 Euros final price), EnDev will try to establish synergies and partnerships with existing programs (VSLAs and 17 cooperatives, which offer deposit and credit to members only; ICSs for refugees and extremely vulnerable HHs by WFP – Approx. 30% of the total *Biikitigi* stoves produced and sold will be

supplied to WFP) by providing their staff with information concerning ICS benefits, with essential behavioural change triggers and with the contacts of the nearest ICSs producers/distributors.

### Enabling environment

- *Advocacy and enabling environment.* As mentioned in ToC chapter and in the “sector alignment” paragraph, the absence of clear national targets for clean cooking, and the lack of a policy framework or standards will be possibly tackled together with WB depending on the Ministry of Energy availability. EnDev-AVSI will try to contribute by sharing its experience on ICSs quality standards control, value chain strengthening, behavioural change campaigns and its field (rural HHs and communities) knowledge.

### **Reasons for Approach**

Given the important vulnerabilities of the country’s context (ref. Chapter 2); given the still nascent ICSs marked supported by the on-going successful activities implemented by GIZ; given AVSI’s widespread and long-time presence/experience in working with rural HHs; and given the limited budget available, EnDev decided to continue building on accepted and relatively affordable technologies (*Biikitigi* stove) and on approaches that are already achieving some results in a challenging context such as Burundi.

All approaches involving imported material or technologies are too costly or not viable due to foreign currencies and import restrictions. Low incomes and availability of free firewood persuade this proposal to target the 90% of Burundi HHs that use wood (80%, 80% of which do not pay it) and charcoal (10%) as cooking fuels.

### **Effectiveness and Cost-efficiency**

The project will focus on the current successful producers/distributors and introduce simple performance-based incentives, which means that dedicated support (technical assistance, material and equipment) will go primarily to producers that are producing better and sell more ICSs units. On the other hand, new producers and point of sales (e.g. in uncovered areas) will be selected and trained accurately, and will be supported gradually but only if their business plans are judged realistic and promising by EnDev-AVSI business experts and if they have already concretely demonstrated commitment, business and technical capabilities.

AVSI (the new country project implementer) will exploit all the existing tools (*Biikitigi* labelling, marketing guide, financial literature manual, marketing kit) practices and partnerships (producers, distributors and stakeholders) developed by GIZ-EnDev. Other synergies will be created with the AVSI-EU funded project in term of mobility costs, supervision, instruments, development, etc. This will grant EnDev’s efficiency and effectiveness whereas using tested and proven technologies and approaches will reduce the cost.

## 1.4.6 Results

Project results	Absolute targets (2010-2023)	Additional targets (2021-2023)	Further relevant impacts/outcomes
People: Access to Cooking (adjusted numbers)	79,131 <sup>17</sup>	10,958 <sup>18</sup>	<ul style="list-style-type: none"> <li>• 30% of the total ICSs will be sold to WFP and benefit refugees and extremely vulnerable households</li> <li>• At least 8 additional MSMEs engaged in local ICSs (Biikitigi stove) production</li> <li>• +20% (M), +50% (W) enrolled in the Biikitigi stove value chain</li> </ul>

Considering all parameters and reduction factors requested by EnDev Outcome Calculation Sheet (OCS), the present proposal will provide access to Biikitigi stove to 10,958 additional people for the whole programming period, however in the first half of 2021 GIZ will still be implementing EnDev Burundi. Thus, AVSI will be responsible for these results only **from July 2021** onwards.

### Other expected outcomes and impacts

1. Contribution to increase HHs purchase power thanks to the savings (money and time that could be dedicated to income generating activities) granted by ICSs adoption
2. Improved health (women, children) thanks to the reduced harmful emissions for families that newly adopted an ICS as main cooking technology.
3. Improved gender equality thanks to women enrolment into the ICS value chain and increased role in HH decision making process toward the adoption of an ICS.
4. Increase sustainable consumption thanks to awareness raising activities, especially concerning cooking fuels (reduced by the adoption of an ICS)
5. Increased MSEs productivity and profitability through all the interventions foresaw to strengthen the ICSs value chain.
6. Increased job creation, technical and business skills

### Preliminary list of indicators

Outcome/ Impact	Indicator	Initial value	Final value	Source of verification
1	Money/Time spent on firewood procurement and cooking (disaggregated by sex)	Baseline value tbd	Money: -40% Time M: -10% Time W: -30%	Baseline/ End-line survey
2	(proxy) No. of people (adjusted numbers) that adopted an ICS x emissions reductions p/ICS model according to laboratory test results	0	10,958	OCS
4	% of people that know at least 2 ICSs benefits in the BCC targeted areas	Baseline value tbd	+30 points %	Baseline/ End-line survey

<sup>17</sup> The absolute target is a tentative projection based on total number of disseminated stoves from 2019 and 2020 provided by the GIZ, that are out of AVSI's control. Only once the formal hand-over of EnDev's operations in Burundi from GIZ to AVSI has been completed (in early July 2021) a definitive baseline for AVSI's projections and a final absolute target can be determined.

<sup>18</sup> Additional target achievement between 01.01.- 30.06.2021 will still be in GIZ's responsibility and is thus not covered this proposal covering the period from 01.07.2021 – 31.12.2023 when AVSI will take over the responsibility for implementing the project in Burundi

5	No. of producers that produce over 100 <i>Biikitigi</i> stove per month	5	10	Baseline/ End-line survey
6	No. of active <i>Biikitigi</i> stove producers	8	16	Baseline/ End-line survey
3, 6	No. of new people (disaggregated by sex) enrolled in the ICSs value chain	Baseline value tbd	M: +20% W: +50%	Baseline/ End-line survey

In the inception phase and before the realization of the baseline study AVSI-Burundi will operationalize the above-mentioned additional results and develop the most appropriate measurable indicators for monitoring also considering the one identified by the new EnDev logical framework. Synergies in terms of monitoring of indicators and impact evaluation may be developed with the Households vulnerability analysis tool (HVAT) - elaborated and under implementation with AVSI's contribution - within the framework of the EU overall program "*Mesures de résilience pour la population Burundaise*". Evaluations (Baseline and End-line surveys) will then be executed by an external (independent) consultant that will measure the indicator values.

### **Main assumptions for the results achievement**

- HHs and businesses buy or invest in cleaner cooking solutions;
- No pandemic major outbreak (e.g. Covid-19), no major political, financial or institutional instability or security problems;
- Supportive or neutral attitude by GoB and LAs vs ICSs market and NGOs operations
- ICSs producers and distributors respect all fiscal, legal and human rights frameworks (especially concerning child labour)
- Current GIZ-EnDev key staff continue to collaborate to EnDev project through AVSI.
- Government and agencies (e.g. WB) allow AVSI to provide EnDev contribution in term of enabling environment
- AVSI's smooth take over from GIZ
- WFP and other agencies continue to buy from EnDev producers the *Biikitigi* stove to be distributed to refugees and extremely vulnerable HHs.

## **1.4.7 Sustainability**

### **Financial sustainability**

Based on GIZ-EnDev Burundi current approach, the project will focus on developing and supporting existing or new profit-oriented players (producers and distributors) assets and skills that will bring increased sales and profits and will therefore strengthen the business case for the provision of ICSs. Every player (at least 10 producers and 10 distributors) will be supported for the elaboration and monitoring of a specific business plan toward their break-even point achievement (if still not reached) and a stable long-term profitability. The knowledge created among providers (financial, managerial and marketing skills) and consumers (demand activation) will persist and generate its effects beyond the end of the programme, informing ICSs providers and other value chain stakeholders' strategies.

### **Institutional sustainability**

The whole intervention will directly or indirectly strengthen the knowledge of all stakeholders involved in the ICSs value chain (producers, point of sales, consumers/households, international organizations, local NGOs and authorities) concerning a market approach meant to

remain. For example, local authorities will be permanently involved in activities implementation (in particular for behaviour change and awareness raising campaigns) at least in terms of permission requests, facilitation and – when possible – even conception, as it is normally the case with all AVSI projects. This facts normally entail local authorities' capacitation and lead them to the autonomous management of ICS-linked initiatives.

The GoB, and especially the Ministry of energy, will be supported, possibly in partnership with WB, concerning quality standard definitions and control, and in terms of elaboration of a clean cooking national strategy trying to share and pass all EnDev lessons learnt, strategies and instruments. In case, EnDev staff will be available to train government staff of ICS production, test and marketing. Having said that, the EnDev contribution to institutional sustainability will strongly depend on the availability of the GoB.

### **Ecological sustainability**

The project will only promote cooking solutions that significantly save cooking fuel (at least 40% firewood, and 30% charcoal – In average, *Biikitigi* stove saves 50% firewood and 30% charcoal), reduce GHGs emissions and limit deforestation. Producers will use raw material that is locally available: clay and, in case, refurbished metal. EnDev quality system will also promote and control a sustainable clay provision (e.g. avoiding and prevent soil erosion, minimising raw material transportation).

### **Technological sustainability**

The technology chosen by the proposal (*Biikitigi* stove) has already proven to be at the reach of producers, consumers, and other stakeholders. Behaviour change campaigns and distributors training will include use and maintenance information; instructions brochures will be disseminated in order to promote a safe, efficient and sustained use of this cooking device. Moreover, by spreading the recently developed EnDev-Burundi quality control system, the proposal will secure that only compliant producers will receive the *Biikitigi* stove label.

### **Social sustainability**

No project's outcomes risk to lead to social tension and or be socially unacceptable because of the market driven and consumer centred approach and the behaviour change promotion will only succeed with the total consent of communities/consumers and if in line with local culture and habits. A special focus will be paid to disincentive and stop child labour and to promote women engagement in the ICS value chain.

### **Exit & handover strategy**

From its inception, the project will be implementing all the activities through existing or new *Biikitigi* stove producers and distributors (private MSMEs) and will aim at the creation of a sustainable market. Those players will be the natural beneficiary and tributary of the programme outcomes that shall remain beyond the project. Within the framework of EnDev market-driven approach, producers and distributors will constitute the heart of the handover strategy. Moreover, the value proposition of *Biikitigi* stove, promotions, and awareness raising campaigns will be informed by a consumer centred approach targeting its permanent behaviour change toward cleaner cooking solutions and habits

## **1.4.8 Gender Strategy and Safeguards**

The Gender Analysis shows that the situation of Burundi women is worrying: unequal treatment between women and men, multiple discrimination of women and girls, and gender-based violence extends from the private sphere to the public social space and to the institutional level in all sectors of life. In Burundi, gender norms are fairly set with understood socio-cultural expectations of both women and men. Traditional Burundi society was generally governed by a system of patriarchy. The role of Burundian women overseeing household and childcare responsibilities is acknowledged and respected and women are called *gahuzamiryango* (the one that binds families together). A girl must learn “female” tasks such as housework, cooking, cleaning and raising children. She is taught to respect men, especially her future husband, and to be hardened to work in the fields. The widespread acknowledgement of these norms often means that gender roles are defined early in a child’s life, and it can be challenging for women or men to break out of these socially accepted roles later in life. Reports highlight an increase of violence against women in the context of the political crisis starting in 2015. Women may face rape and other forms of sexual violence, domestic violence, torture, enforced disappearance, extrajudicial execution and human trafficking. The political repression extends to women involved in the opposition parties and women from civil society. In general, the authoritative role of men and the subordinate position of women is reflected in the economic life and access to energy and technologies.

The project should be guided by the basic concept of considering women as the primary beneficiaries in a Burundi society in which gender discrimination is socially and culturally accepted. To face the unequal treatment that women suffer in Burundi, the project’s activities should create an empowering process to promote gender equality. In the intervention sector, women will be positively impacted as consumers of new cleaner cooking solutions as well as entrepreneurs. The project aims to develop and express the untapped potential of female workforce (supply) and to improve domestic conditions of women and children most affected by inefficient cooking appliances (demand).

On the supply-side, with the support of income-generating activities such as sales of ICS and ceramic components manufacture, women could acquire a major financial autonomy and independence from men. Moreover, the project should train and provide skills to ICSs sales women and improved cooking promoters. On the supply-side, women will be targeted through activities that will take into consideration their specific needs. Since women are the final users of cooking devices, special attention will be given to improve the family income, women independence and role within communities and families and to reduce the health risks related to the use of traditional cooking methods.

In order to guarantee the Do-No-Harm principle, the messaging of the awareness campaigns and the communications with local authorities should clearly show that the inclusion women is an added value for the community. This is crucial since at different levels of society, there is a general criticism on women’s empowerment due to the opinion that it does not fit with the local culture. Men usually misunderstands the inclusion of women as a replacement of the male workforce. Furthermore, to ensure that local communities do not create resistances to the gender equality promotion, the participatory approach should also directly involve men as well as institutional and economic stakeholders.


AVSI, per its own culture and mission, embeds in its projects and daily life of the organization a transformative approach to promote personal and human development, with a special attention to gender equality in order to generate, internally and externally, a long-lasting impact in



this direction. These aspects are promoted, among other means, by awareness raising and internal trainings based on internal policies that all staff is oblige to respect.

# 1.5 Cambodia with Laos

## 1.5.1 Summary and key data

Promoted technologies			
	<p><b>Clean and Improved Cooking Programme in the Mekong Region</b></p> <p>Goal: Improve livelihoods, enhance job opportunities, and reduce environmental pressure by market acceleration of advanced, modern, and improved cooking technologies.</p> <p>Countries: Cambodia and Laos</p> <p>Demand creation by behaviour change communication and promotion through women-oriented organisations (Commune Council for Women and Children in Cambodia and the Lao Women’s Union).</p> <p>Supply development: RBF for advanced biomass stoves and modern cooking energy suppliers. Artisan producers and retailers receiving training, coaching and quality control services.</p> <p>Enabling environment: capacity development for national and subnational (non) governmental organisations to enable markets by providing quality control services, behavioural change communication and M&amp;E activities.</p> <p>Innovations and lessons to learn: gender focussed based Behavioural Change Communication for clean and improved cooking; upscaling and replication of bringing systems change to ICS markets.</p>		
Summary of proposed interventions(s)			
	<b>Quantitative targets [# of]</b>		<b>Further relevant impacts/outcomes</b>
Cooking / thermal energy for households	Additional target: (2021-2024) 31,555 (adjusted net figure as per OCS)	People	<ul style="list-style-type: none"> <li>45 ICS and sic ABC/ME production entrepreneurs</li> <li>4 subnational governments capacitated in stove testing</li> <li>120 subnational govt take responsibilities of BCC.</li> <li>2 associations taking lead roles in ICS market facilitation.</li> </ul>
Energy for productive use / income generation	Additional target: (2021-2024) 1,120 (adjusted net figure as per OCS)	MSMEs	<ul style="list-style-type: none"> <li>5 ICS production entrepreneurs selling institutional /medium ICS.</li> </ul>
Project period	01.01.2021 – 31.12.2024	<b>Indicative Budget</b>	4,170,255 Euro

## Introduction

The aim of the Mekong Clean and Improved Cooking Programme in Laos and Cambodia is to contribute to a transition of the cooking energy sector, to EnDev's strategic priorities, and to SDG 7.1.2.

Under the Mekong programme, EnDev is following a market-based approach, with interventions that strengthen supply, enhance demand, and support the enabling environment. It makes significant contributions to EnDev's overall objectives to "energising lives", "energising opportunities", and "energising climate" in a realistic, innovative, and efficient manner.

Clean cooking refers to modern energy cooking solutions (electricity, advanced biomass stoves and LPG ) that replace the use of traditional biomass stoves and have an aspiration to reduce health risks associated with smoke exposure. This is proposed for Cambodia.

Improved cooking is achieved through the market development of superior biomass cookstove models that save fuel, and therefore reduce pressure on the environment, as well as time of cooking. This is applied in Laos. Improved cooking is also a matter of cooking behaviour which is stimulated in both Laos and Cambodia.

The programme takes on board lessons learned over the past decade in cookstove market development and behavioural change from within and outside the organisation, and across sectors. It replicates successful formulas while adjusting from past challenges, thus leading to an innovative and cost-effective intervention proposition.

Collective learning is carried out in parallel to the implementation, with two clear goals: (1) to help to understand the feasibility of utilising an integrated village based approach focussing on demand, supply and governance bolstered by behaviour change communication (BCC) interventions as a method of promoting clean cooking (Cambodia) and (2) to demonstrate a significant consolidation in a thriving cookstove market and replication of market-based interventions to new areas (Laos) paving ways for the introduction of higher tier ICS in the long run.

## Summary of the Mekong programme

In **Cambodia**, the focus of the programme is on changing behaviours and cooking habits at communal and village level. The Smoke Free Village (SFV) campaign offers an integrated approach that combines:

- demand creation for clean cooking environments and technology options,
- supply chain strengthening to promote access to clean technology options,
- BCC to promote smoke free cooking
- Governance to facilitate the transformation to smoke free cooking.

The RBF facility for Advanced Biomass stoves and electric cooking will stay in place only for 2021 only after which the supply has been established and sustained by its own demand creation. The support to the association for ceramic stoves CESPAC will also cease after 2021.

In **Laos**, the EnDev programme is strengthening its well-established ICS franchise in the south and central regions and expanding its successful market-based approach towards northern provinces thus covering with 18 provinces the entire country. Diversification and

improvements in stove design include medium-sized cookstoves catering to the needs of restaurants and social institutions such as monasteries, residential schools. Structural market barriers such as unorganised and partial distribution networks, the lack of technical knowhow for mechanisation and standardisation of production, and peoples' status quo around behaviour and perceptions are addressed. New stove innovation will be added to the mix of technologies and exploration of ME opportunities will be done.

#### Expected Results

- **Cambodia:** 14,000 clean cookstoves (ME and ABC) and 5,000 improved ceramic stoves.
- **Laos:** 340,000 improved ceramic cookstoves (of which 214,500 stoves under Gold Standard and leveraged by EnDev.)

#### Programme partners:

- **Cambodia**
  - Ministry of Environment (MoE), and Ministry of Rural Development (MRD)
  - Community Committee for Women and Children – CCWCs, schools, pagoda's
  - Cambodian Efficient Stove Promotion Association
- **Laos**
  - Ministry of Science and Technology (MoST), Provincial Departments of Science and Technology (DST) and Renewable Energy and New Material Institute (REMI)
  - Association for Rural Mobilisation and Improvements (ARMI), a local NGO
  - Lao Women Union (LWU)

## 1.5.2 Theory of change (ToC) and state of market

### Cambodia

The experiences in Cambodia show that the previous supply chain development approaches under RBF were reaching insufficient momentum in view of EnDev's higher transformational ambitions. In total 16 thousand ABC were incentive since mid-2016 to end 2020, yet out of the six entrepreneurs only one or two are viable.

The adoption of stoves assessed by the data of the independent verification agency shows that across the cookstoves models 50% were adopted, 25% showed low adoption levels and 25% was not used at all.

The question of adoption is a universal one, and been subject of many impact studies and surveys, where it is explained as a phenomenon of stove stacking and the need for BCC to increase adoption<sup>19</sup>. In 2020 EnDev brought to life an international BCC working group to stress the importance of BCC in its clean cooking portfolio.

The proposed Smoke Free Village campaign gives answer to the adoption challenge and takes learning from the successful approaches of SNV under WASH and related demonstration of area-wide Open Defecation Free (ODF) using the same integrated approach to

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<sup>19</sup> For instance, Up in Smoke: The Influence of Household Behavior on the Long-Run Impact of Improved Cooking Stoves [https://scholar.harvard.edu/files/remahanna/files/1\\_stoves.pdf](https://scholar.harvard.edu/files/remahanna/files/1_stoves.pdf)

facilitate market development for both suppliers and small shops selling clean cooking energy products.

Of its 2.2 mln rural households, 79% is mainly using firewood, 10% LPG and 8% charcoal. 79% is connected to the electricity grid, but only 2.3% of households are using electricity as the main cooking energy source<sup>20</sup>.

Theory of Change - EnDev [Cambodia]			
<b>Impacts</b>	<p>Envisaging Lives - Social development Improved livelihoods and enhanced quality of life of people, particularly that of women and children, the poor and persons with disabilities through improved cooking, saving money, time and increased convenience.</p>	<p>Envisaging Opportunities - Economic development Job opportunities are created and continue to be maintained in the ICS, ABC and MECS markets. Gender and social inclusion is promoted in the clean cookstove sales environment</p>	<p>Envisaging Climate - Combating climate change Stoves/fuels reduce GHG emissions by lowering or eliminating the need for wood and charcoal as cooking fuel.</p>
<b>Assumptions</b>	<p>The Smoke Free Village makes clean cooking aspirational and desirable by an informed choice, which triggers demand the private sector benefits from by more sales. Supply chain recognises a higher demand for clean cooking products and openness of villagers, boosting turnover and making business in clean cookstove more profitable and commercial viable. The enabling environment is enhanced by a supportive local government and institutes. On national level engagements with Ministry of Environment of Ministry of Rural Development will push for cooking energy on national level.</p>		
<b>Outcome</b>	<p>The outcomes are behaviours changes of village households in cooking practises taking care of drying wood, of optimizing ventilation and ensure the avoidance of smoke exposure for household members, especially for children, as well as the behaviour related to purchases of modern cooking energy and advanced biomass cookstoves.</p>		
<b>Assumptions</b>	<p>Community based integrated area-wide approaches (Smoke Free Villages), deepened by the involvement of local authorities and BCC interventions form an effective basis for increasing demand and sales adoption of higher tier stoves, ABC and MECS.</p>		
<b>Outputs and results</b>	<p>The outputs of the integrated SFV approach per component are as follows: Demand creation: capacity building of skills of local facilitators (Commune Committee for Women and Children, SFV committee members, CCs VC, health and school authorities and monks, etc.) in villages to implement effective behaviour change activities, that take into account differences between communities and households. Supply chain: through coordinated efforts enterprises engage and expand their businesses in the target areas through participating in demand creatig SFV activities (fairs, events), and cooperation with local authorities particularly by involving them in SFV activities. BCC: The SFV approach works to introduce and build capacity in BCC methodologies at the local level in villages with the active involvement of local authorities. Outreach includes also social media outreach, events and activities incorporated into pagodas, schools and health centres, along with community campaigns. Enabling environment/Governance: The SFV approach builds the capacity of local authorities in villages, to promote and achieve smoke free villages, to manage information and resources, and address equity through targeting the poorest households, persons with disabilities and women. The SFV approach recognises that the poor, women and people with disabilities (PWDs) need changes to occur in several areas and levels to overcome biases and to ensure equity of access through participation in decision-making. The SFV approach will expose both men and women to positive role models that highlight equality between the sexes. This will strengthen women's ability to take decisions in the household and the community with regard to clean cooking and investments made therein, and promote women enterprises to join the clean cookstove supply chain. Simultaneously, the SFV approach will work towards influencing cultural norms that perpetuate discriminatory practices and that also limits access for women, PWD and the poor to clean cooking energy sources. The establishment of a monitoring framework will allow to demonstrate results on the basis of facts and evidence and to adjust strateggies. One corner stone in the outpus is the training and roll out of the logbooks kept by local authorities and showing the cooking situation at household level. These data will be triangulated with cookstove tests, independent evaluation surveys and SNV's observation to arrive at an assessment of the success and fail factors of BCC for clean cooking.</p>		
<b>Key interventions</b>	<p>Key of the intervention are activiteits around capacity building for market stimulation and around monitoring of trends and analysis in the as a collaborative learning process. Demand creation under the Smoke Free Village Campaign: Behaviour change communication to accelerate transition to modern cooking for ABC and MECS (Cambodia). Enabling environment: link public and private sector actors effectively, generate evidence-based knowledge for lobby and advocacy purposes and effective involvement of subnational governments. Local governmental involvement is seen as a strategic choice when cooking energy falls between line Ministries responsibility on national level.</p>		
<b>Barriers</b>	<p><b>Supply side barriers.</b> Lack of entrepreneurship or management skills No access to collaboration with local authorities Limited market intelligence Access to finance or grant opportunities. It is challenging making a profit in a highly price competitive market.</p>	<p><b>Demand side barriers</b> Cash-poverty; unaffordability to invest in more expensive cleaner stoves. Perceptions on costs/relevance to change cooking behaviours. Awareness and promotion campaigns too costly activity for higher tier stove companies.</p>	<p><b>Enabling environment barriers</b> Limited political will and ability to drive the cookstoves agenda. Limited prioritization of higher tier stove subsector. Lack of information/knowledge sharing among policy-makers, financial sector and other stakeholders.</p>
<b>Assumptions</b>	<p>The existing Modus operandi of different stakeholders on promotion and awareness raising is not effective enough in creating demand for higher tier stoves. Government has not prioritized improved cooking at household level as urgent and the existing policy and regulatory framework is not conducive to create an enabling environment for the dissemination of higher tier stoves. The current MFI Interest rate cap makes it challenging for poor households to access finance for higher tier stoves. The women, PWDs and ID Poor households do not find a voice or choice as far as clean cooking options and related finances are concerned</p>		
<b>Root cause</b>	<p>The root cause of the limitation to access to improved and clean cooking energy in Cambodia are poverty, habits, unawareness and a weak supply chain. The demand for cookstoves and fuels is typically singularly focussed on price without concern about quality, long term effects on health, and livelihoods. In turn, the supply chain businesses lack opportunity and leaves the market with stove models that are competitive on price, with dire impact on health, livelihoods, and environment. The enabling environment is limited with cookstoves as a topic falling besides any line Ministry with little priority and no budget allocation for activities. Several disparities exist in Cambodia which perpetuate gender, socio-cultural and economic inequalities in relation to development services. Social norms prevent women, PWDs and poor families to access and benefit from decision making processes involving clean cookstoves and related financial needs.</p>		
<b>Core problem</b>	<p>Households in rural Cambodia have insufficient access to suitable, affordable, efficient, clean and environment-friendly cooking solutions. The prevailing traditional cooking practises yield a range of negative impacts (financial, time, health and environment) that affect livelihoods, particularly of women and girls, PWDs and poor households.</p>		

<sup>20</sup> <https://www.nis.gov.kh/nis/Census2019/Final%20General%20Population%20Census%202019-English.pdf>

## Laos

The population of Laos is estimated to be 7,275,560 residing in 1,372,447 households (882,676 rural and 490,071 urban households). In the last nine years, slightly more than 440,000 ICS have been sold in the country. Assuming the rough estimate of 70% of the total rural households as potential customers of wood-based ICS; and 40% of urban population to buy charcoal ICS as well as additional 25% of rural population also to adopt charcoal stoves, the present production capacity would need another 9 years to fulfil the demand. These calculations do not include the added households because of population growth which is 1.48% at present. As the lifespan of ceramic ICS being disseminated does not exceed 2 years, every year there will be an additional of potential customers.

These figures indicate the need to increase the production capacity of the existing producers and/or establish and strengthen some more new producers and distributors to cater to the need of the market.

The ambitious goal of the Government of the Lao PDR (GoL) to keep forest coverage at 70% and include forestry as one of the major pillars contributing to poverty reduction in the country is at high risk<sup>21</sup>) due to rampant deforestation as well as deep-rooted slash-and-burn practices. From 2001 to 2019, Laos lost 3.37 Mha of tree cover, equivalent to a 18% decrease in tree cover since 2000, and 1.29Gt of CO<sub>2</sub> emissions<sup>22</sup>. The 2011–25 roadmap of the GoL's Renewable Energy Development Strategy identifies advanced biomass cookstoves and biogas systems as specific areas for promotion and development. In addition, the National Adaptation Programmes of Action (NAPAs) support the efficient use of forest resources and the development and scaling up of low cost, clean and efficient energy solutions as a priority measure for adapting to climate change. However, these commitments have not been fully translated into action. The National Green Growth Strategy 2018<sup>23</sup> identifies “gender roles” as one (out of four) cross-cutting topics to address, with particular focus on “raising the roles and promoting the advancement of women to decrease the differences between men and women in all socio-economic fields”.

The programme will continue strengthening the capacity of supply side actors to deliver quality



*Photo: Production workshop of ICS brand with blue sticker, EnDev Laos 2021*

services related to production, distribution, sales, and marketing of ICS simultaneously with effective behavioural change communication initiatives. The strengthened capacity is translating into more affordable ICS solutions which is manifested in the 312% growth in ICS sales 2020 in comparison to 2019. The ultimate objective is the establishment of a self-propelling, vibrant and inclusive market steered by local and largely female entrepreneurs that allows for easy and affordable access to ICS to far-flung regions in Laos. Innovations in stoves models will help restaurants and institutes to save fuel, time, and money.

<sup>21</sup> <https://www.giz.de/en/downloads/LaoPDR-PLR-Gap-Analysis-Summary-Report.pdf>

<sup>22</sup> <https://www.globalforestwatch.org/dashboards/country/LAO>

<sup>23</sup> Lao PDR/Secretariat for Formulation of National Green Growth Strategy of the Lao PDR: National Green Growth Strategy of the Lao PDR till 2030.

## Theory of Change - EnDev [Laos]

<b>Impacts</b>	<b>Energising Lives - Social development</b> Improved livelihoods and enhanced quality of life of people, particularly that of women and children, through improved cooking, saving money, time and increase convenience.	<b>Energising Opportunities - Economic development</b> Job opportunities are created and continued to be maintained in ICS markets. Economic conditions of supply chain actors mainly producers and retailers improved.	<b>Energising Climate - Combating climate change</b> Stoves/fuels reduce GHG emissions by lowering or eliminating the need for wood and charcoal as cooking fuel.
<b>Assumptions</b>	Improved and improved cooking solutions to become available, aspirational, affordable, and functional. Supply chain recognise a viable business opportunity in which people make a decent living by the sales of ICS. The government, the MoST taking responsibility on quality control and LWU is cooperative on the promotional activities. NGO ARMI assumed to drive the agenda and links its networks to drive the programme.		
<b>Outcome</b>	The outcomes are stimulating behaviours and markets: commercial supply chain development and business support for producers of ICS for domestic and institutional use. Service provision of market development done with a national NGO and promotional activities provided through local authorities Lao Women Union (Laos) and quality control by Ministry of Science and Technology and its provincial departments that operate the testing labs.  Stakeholders are open and transparent to share knowledge and information to improve the sub-sector, the civil sector actors are able to operate and the private sector is encouraged to pursue their businesses.		
<b>Assumptions</b>	The assumption is that the outputs such as training, coaching, and advisory services are leading to enhanced capacities, motivation and ability to carry on with minimal and decreasing reliance from EnDev.		
<b>Outputs and results</b>	<p><b>1. Production and distribution support</b></p> <p>i. Six new producers and five new distributors are technically and managerially capable to deliver quality services and diversify their business. Women and men producers, distributors and retailers use the developed sales and marketing tools. Viable business cases are identified, and success models replicated.</p> <p>ii. Cost effective distribution system identified, cluster approach of dissemination of ICSs practiced.</p> <p>iii. Capacity building needs are addressed for women and men retailers like effective relationship building between distributors and retailers. The women and men retailers gain equitable financial earnings through increased sales.</p> <p><b>2. Quality Assurance, Research and Development (R&amp;D)</b></p> <p>iv. Quality standards and quality assurance mechanisms are developed and actively enforced.</p> <p>v. R&amp;D carried out to develop better models and including new Institutional stoves for shops, restaurants and hospitals which are efficient, cost effective and affordable.</p> <p>vi. ICS designs are adopted to match the cooking requirements and acceptability of users mainly female users.</p> <p><b>3. Promotion and Marketing</b></p> <p>vii. Behavioural change communication strengthened, people know about the cost and benefits of ICSs; raised awareness of women and men will result in higher uptake of ICSs.</p> <p>viii. Gender-based constraints related to access to ICSs, training, employment and entrepreneurship are identified with particular focus on inclusion and representation of women and men living with disabilities.</p> <p><b>4. Coordination, Knowledge management and Evidence-based Advocacy</b></p> <p>ix. Coordination with similar projects, for example, the World Bank funded Clean Cooking Project established and areas of mutual cooperation identified and operationalised. ICS uptake increased as a result of integration with other thematic projects.</p>		
<b>Key interventions</b>	<p>Supply: (i) Support the establishment of new production centres and strengthen their capacity; support existing and new producers to improve manufacturing quality, product range, marketing and distribution chain relationships; (ii) develop a distributor network that can reach rural areas effectively while strengthen the capacity of the distributors in marketing, operation and business management, (iii) improve the financial literacy of producers and distributors and make them aware of the resource management.</p> <p>Demand: (i) Deploy a range of approaches (promotion, BCC, demonstration, community meetings) to inform communities on the benefits of higher tier stoves following a technology feasibility assessment, involving local organizations (Lao Women Union, ARMI) and a network of similar initiatives (e.g. SNV's ENUFF Project's voucher scheme, World Bank's ICS project, GIZ's REDD+) to reach relevant communities; (ii) build capacity of Lao Women Union to integrate GESI approach in every steps of project implementation through household dialogue and BCC.</p> <p>Enabling environment: (i) Advocate and lobby, with stakeholders, for a policy and regulatory environment conducive for private sector participation in the entire ICS value chain and inclusion of ICS targets in the NDC, NAMA and national RE strategy; (ii) Strengthen capacity and mobilize partners to enhance participation of women, disadvantaged group and marginalized population; (iii) inventorize best practices, generate evidence-based knowledge, develop mechanisms for retrieval, application and sharing of knowledge and network with partners to share lessons learnt.</p>		
<b>Barriers</b>	<b>Supply side barriers</b> Cookstove producers lack business mindedness and know-how on innovation and market intelligence Unavailability of technical support, and lack of motivation and resources for the establishment of production centres in rural areas Scattered demand and poor distribution infrastructure (including transportation network) leading to high operation costs	<b>Demand side barriers</b> Reluctance of people to change their cooking practices and behaviour, concerns that modern appliances will negative impact on taste and preferences Lack of access to improved cooking solutions in rural areas Reluctance to adopt new technology and poor affordability of rural people; and abundance of cheaper stoves in market.	<b>Enabling environment barriers</b> Limited political will and ability to drive the cookstoves agenda Lack of skill to transforming implicit knowledge into explicit information in which special skills and often creativity are needed. Government policies and interest mainly focuses on production of electricity and household cooking sector is often overlooked. Lack of effective strategy and policies to mainstream GESI in ICS interventions.
<b>Assumptions</b>	The market status quo is not stimulating innovation and expansion/growth. Limited willingness and commitment of distributors to diversify their business and address user's adoption barriers. Lack of a platform for coordination and stakeholders working in isolation. Ineffective GESI approach will hamper in energy transformation. Government's ignorance hampers the creation of conducive environment to boost the uptake of ICSs. Lacking MEL approach prevents effective sharing of lessons, constraint and challenges at sub-sector level.		
<b>Root cause</b>	Producers have insufficient capacity, market intelligence and support provisions to introduce innovative and appealing locally-made Advanced Biomass Cookstoves (ICSs) for the rural market. The quality of their products does not yet fully meet higher-tier cookstove performance standards for fuel efficiency and emissions.  The current market / product combination does not allow a feasible business case for distribution and retail in rural isolated areas.  Lack of motivation, awareness and knowledge of people in rural areas about the cost, benefits and usefulness of ICSs and absence of effective promotional strategy limit the uptake of ICSs.  Lack of effective engagement of government and stakeholders in policy implementation and perception of the government that cooking is a private affair of people impede the creation of enabling environment. Ineffective strategy on evidence based advocacy and learning limits knowledge management.		
<b>Core problem</b>	Households as well as institutional and commercial/business customers in Laos have insufficient access to suitable, affordable, efficient and environment-friendly cooking solutions. The prevailing traditional cooking practices yield a range of negative impacts (financial, time, health and environment) that affect livelihoods, particularly of women and girls.		



### 1.5.3 Transformative character

#### Cambodia

##### Market development

Previous experiences by EnDev in Cambodia with RBF have provided a valuable global lesson: a sustained market development initiative cannot take root optimally without a strong focus on enabling environment created by the involvement of (local) government authorities and without an impartial organisation to stimulate initial demand and link this demand to the supply chain. Other lessons from impact studies from around the world, demonstrate that clean cookstoves are only partial functional due to cooking habits, technical constraints and overall inappropriateness, which constraints satisfaction and therefore depress the generation of an active demand.

As such, Cambodia's intervention is founded on the theory that after an integrated approach with the involvement of local government authorities and BCC interventions, a desire for clean cooking is creating that establishes new norms and lasting change. This approach is fundamentally different and transformative since the starting point are people's agreements on the problem and not on a proscribed menu of technical solutions.



**Photo:** Commune leaders taking the Smoke Free Village “pledge” in the presence of District Governor, Banteay Meas district. EnDev Cambodia 2021

The enabling environment under SVF is characterized by the capacity building-efforts provided to local governments to let them become able to bring across the knowledge and the information around cooking and health, livelihoods and household economies.

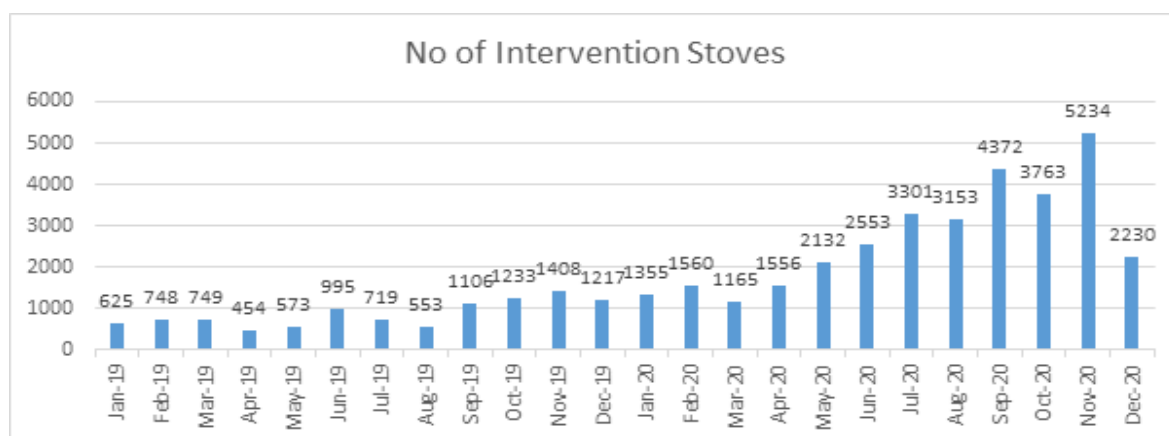
##### Laos

Transformative change in Laos is founded on a strong foundation of market based, multi stakeholder approaches, framed around a franchise brand. These stoves with a distinct blue label have been the result to women-centered designs iterations, that perfectly meet the needs of end users but with less fuel than baseline stoves. The cooking demonstrations and laboratory analysis of intervention ICS indicated that the saving on firewood is in the range of 46 to 56% and that on charcoal is 28-30% as shown in table in Chapter-8.

The comprehensive sectoral approach supporting the franchise brand, will be solidified by (a) capacity strengthening of new production centers in the north, (b) product and market diversification for existing producers whilst maintaining the existing focus on quality (c) strong emphasis on quality assurance mechanism for fuel efficient stoves, and (d) effectively collaborating with Lao Women Union for the integration of gender and social inclusion through BCC, household dialogue and cooking demonstration approaches.

The comprehensive sectoral approach supporting the franchise brand, will be solidified by (a) capacity strengthening of new production centers in the north, (b) product and market diversification for existing producers whilst maintaining the existing focus on quality (c) strong emphasis on quality assurance mechanism for fuel efficient stoves, and (d) effectively collaborating with Lao Women Union for the integration of gender and social inclusion through BCC, household dialogue and cooking demonstration approaches.

The programme in Laos makes for a strong case of how markets convert. The present status demands for dedicated inputs from SNV to consolidate the sector and to replicate the approach to new areas. The following graph illustrates the achievements in terms of number of ICS produced and sold under the framework of EnDev support in 2019 and 2020.



### Economic development

The impact of the programme on economic development is realised by the opportunity SFV offers to the supply chain, whereby it by creates demand through local government authorities and links the demand generated to the supply chain which enhances stove sales in areas that before were not feasible due to lack of active demand. Sales teams of ABC experience a much greater rate of deal closures than in other places and line up to give commercial follow up to BCC activities, whereas and in parallel local markets shops offering ME are benefitting as well when villagers want to buy a stove.



*Photo: Children participating in wall painting competition as part of Smoke Free Village Day activity in*

In **Laos**, besides the existing designs of domestic ICS, medium sized ceramic ICS will be designed, produced, tested and disseminated to cater to the growing needs for institutional customers (schools, hospital canteens) and commercial customers (such as roadside shops selling local Lao food items). In the sup-

ply chain, domestic ICS are sold as an extra item in over 1,600 convenience shops along roadsides, which give the (mainly female) shop owners a profit margin of 1 USD, which is much higher than traditional ceramic stoves. The current monitoring data suggest that on average, 5 full time workers find employment in each of the 30 production centres out of which 47% are female and 5 are people with disability. 50% of the production centres are owned by women entrepreneurs. The project interventions are contributing to the economic development of both men and women equally.

## Social Development

The relevance of clean cooking in Cambodia and social development aspects are the ones that take effect when ME replace traditional cooking and add to convenience, time savings on collecting fuel and cleaning pots, dignity and personal odour, and of course the reductions of risks to diseases including Covid, associated with smoke exposure.

The burden of disease estimates by WHO attributes 14,729 premature deaths including 856 children to HAP in Cambodia. Positive health outcomes of clean cooking were studied in 2015 by Berkeley University concluding that ACE stoves result in 1,295 and biogas in 2,770 Avoided Disability Adjusted Life Years (ADALY). Hivos executed a similar study in the same year for biogas in Cambodia and drew comparable conclusions. Exposure is particularly high among women and young children, who spend the most time near the domestic hearth<sup>24</sup>.

**In Laos**, the ICS models (WS3 and REMI fuelwood stoves) delivers advantages mainly in terms of fuel savings (refer to Table in Chapter-8), and 1/3 for charcoal resulting in 25 USD per year in cost savings alone in the case of charcoal. ICS have much longer longevity (from 6 months to 2 years) which compounds the financial net benefits as fewer stoves need to be bought over time. Convenience and time savings are important attributes to livelihoods and well-being for women. In 2014, SNV commissioned a gender audit executed by Wocan in the framework of its W+ credit system. This report concluded that ICS saves 30 minutes per day that can be put in women's' leisure time or productive activities. A recent gender scanning also suggests that the current project is doing remarkably well in engaging women entrepreneurs in the production process and as retailers<sup>25</sup>.

## Poverty alleviation

**In Cambodia**, in the selected SFV, census data shows that 15% of households reached, are on the official governmental poverty list. For these households, purchasing ME and ABC are not within reach, so instead of purchases they are advised on no-cost behaviours which are propagated under the SFV campaign: staying away from smoke, ensuring that households take care of proper wood drying and optimize ventilation. Possible cooperation with charity organisations may help to achieve clean cooking for this segment of society that is excluded from markets by financial poverty. The number of ID Poor households, PWDs, women-led households adopting the SFV behaviours (drying of wood, cooking in a well-ventilated environment, keeping children away from smoke while cooking) are monitored and recorded in the SFV logbooks, and incremental change can be measured as a result.

**In Laos**, the locally made 6 USD stoves are widely available on local markets yet reaching remote villages and the BoP remains a challenge. Therefore, collaboration is established with community-based interventions that include ICS as one of the methods to improve livelihoods under the SDC supported SNV implemented, Enhancing Nutrition for Upland Farming Families (ENUFF). Stoves are payed through a voucher system. The programme will also continue collaborating with government supported 'Governance, Forest Landscape and Livelihood (GFLL) Programme.

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<sup>24</sup> <https://www.who.int/en/news-room/fact-sheets/detail/household-air-pollution-and-health>

<sup>25</sup> Gender analysis for the follow-up project "Market Acceleration of Advanced Clean Cookstoves in the Greater Mekong Sub-Region", SNV/EnDev 2021.

The Lao Disabled Women Development Centre offers training in vocational skills and job opportunities to handicap women who otherwise would be left idle at home.



In 2015 the first steps were made to add ICS production to their product offerings of embroidery. This production center is still operational and EnDev will continue to support this initiative.

*Photo: Lao Disabled Women Development Centre operating its ICS production workshop, SNV Laos*

#### 1.5.4 Collaboration

In Cambodia and Laos, the SNV teams are well accustomed to strategic relationship building with institutions and organisations surrounding the sectors it is working in. Aligning and synergizing efforts with others are ingredients to success. SNV as an externally funded organisation is buoyant by collaboration. Given our long-lasting presence in Laos and Cambodia, virtually all actors in the cookstoves sector are tied in to SNV's present and past projects.

##### Sector alignment

##### Cambodia

On the national level, top level meetings have been held with the Ministry of Rural Development and the Ministry of Environment. Both are important partners to the agenda of climate, the directives on air pollution and NDC and rural livelihoods. The updated NDC 2020 received at the time of writing this proposal, has unfortunately reconsidered its commitments to cookstoves made in the previous version. SNV management concluded that the cooking agenda is better placed with subnational governmental bodies that are closer to the needs of rural people.

On global level, the monitoring data are aligned when EnDev is able, as one of the few programmes in the sector, to provide access to clean energy as a percentage of the targeted population, which is aligned with SDG 7.2.

Collaboration with the private sector will be deepened with selected ABC companies and ME providers EnDev collaborated under RBF in 2021 that paves the way to enter Smoke Free Villages, without RBF after 2021.

The UK funded Modern Energy Cooking Service programmes and its collaboration with the NGO DE in Cambodia, are supported by EnDev by providing RBF for electric cookstoves



(induction). EnDev sees an important opportunity to continue to exchange and share knowledge products with IDE SNV and IDE staff meet on informal basis, having agreed to prepare for a joint workshop about clean cooking in 2021.

## Laos

Under a market driven, multi-stakeholder approach, SNV Laos will continue to play a catalyzing role in sector development and collaboration. The programme aligns with priorities of the Ministry of Energy and Mines (MEM)/ Institute of Renewable Energy Promotion (IREP) and Ministry of Natural Resources and Environment (MoNRE) to contribute the achievement of SDGs. This programme will help Lao Government's ambitious target of keeping forest cover to 70% and adheres to the 2011–25 roadmap of the Government of Lao PDR's Renewable Energy Development Strategy which identifies advanced biomass cookstoves and biogas systems as specific areas for promotion and development.

The ongoing collaboration with Renewable Energy and New Materials Institute (REMI) under the Ministry of Science and Technology (MoST) will be continued to institutionalize ABC testing, research and development, and quality assurance. The existing testing laboratories in Vientiane Pakse, Savannakhet and Louang Prabang will continued be supported with technical advisory services. Likewise, collaboration with Lao Women Union and Lao Disabled Women Development Center will further be strengthened to support in behavioral change communication and integration of GESI with project activities.

## Implementer Base

### Cambodia

In Cambodia, the implementation is done by the local governmental bodies, health and school authorities and pagoda's with support of SNV's field coordinators. They will be capacitated in the SFV interventions and conducting activities, in proper use of tools, and in monitoring with guidelines and manuals. The SFV committees represents men and women from different sub-national authorities, and these takes care of the verification of the monthly logbooks (on quarterly basis), so that EnDev can keep track of trends of responsiveness to the SFV campaign.

Three ABC producers receive RBF and grant support to enforce the supply of clean cookstoves in and outside SFV, three e-cooking companies receive RBF in and outside the SFV areas and some 25+ local shops selling e-cooking devises and LPG will receive support through interactions with the SFV.



*Photo: Local shop selling modern cooking energy SNV EnDev Cambodia 2021*

and independent verifier (survey firm) executes the RBF verification and the evaluations of SFV to provide unbiased data and on the sales and effectiveness of the campaign.

The Institute of Technology of Cambodia (ITC) hosts the Biomass Energy Lab set up by

GERES in previous years. The ITC measures fuel consumption of modern energy options vs traditional cooking and gives evidence to that by applying different testing protocols.



*Photo: Smoke Free Village Cook Fair activity, with clean cookstoves demonstration and related sales “pitch”, EnDev Cambodia 2021*

CESPA is the association of ICS in Cambodia to promote and support the supply chain of improved ceramic models. The ICS cookstove model from Laos (WS3) has been introduced successfully and made by 15 artisan producers. As the programme will divert attention to SFV the support to CESPA will be phased out in 2021.

### Laos

The main legwork of market facilitation services in Laos are provided by the Association for Rural Mobilization and Improvement (ARMI), a Lao local NGO specialized in dissemination of ICS. ARMI coordinates field activities like training, ensures smooth communication with the private sector, facilitates the promotion by the LWU and deploys timely the test labs and quality assurance activities by the MoST. REMI/MoST and DST will continue to take the lead responsibilities of stove testing and R&D.



*Photo: Representative panel help to inform about appropriate stove designs and materials, EnDev SNV Laos.*



*Photo: One of the four Cookstoves Testing labs used for quality control and R&D, SNV Laos*

LWU will continue to take an instrumental part in facilitating behavioral change communication activities, cooking demonstrations, hosting market stands and exposure to generate demand and brand awareness.

The programme will - driven by the World Bank funded Lao Clean Cookstove Programme- set up an association of producers and distributors that is expected to transform the sector by streamlining activities related to production and distribution, making the sector more responsive

## **Leverage**

### **Cambodia**

The lessons and market responsiveness of the SFV will be leveraged by extension towards to the market players of ME that benefit from an increased demand for clean cooking technologies.

The delivery channel through CCWCs, CCs, VCs, and health centre and school authorities and monks and the incurred capacity improvements from SNV's support, will open doors for other initiatives around rural development that touch upon the livelihoods of women and children.

Under the WASH programme the sanitation activities continue beyond the programme with local authorities continuing providing BCC services keep maintain their villages clean and free from open defecation.

As part of the Smoke Free Village (SFV) approach, and in line with similar past experiences with WASH, the project envisages establishing Commune Clean Energy Working Groups (CCEWGs). Ideally CCEWGs will fundraise through development partners, charity, or using the commune funds to continue promoting SFV approach.

Leverage is furthermore explored with the initiatives under IDE/MECS in terms of collaboration on learning, reporting and dissemination of knowledge and experiences. SNV has awarded IDE a contract to partake in the RBF facility with regards to induction cookers.



Initiatives are under way through CQC driven carbon project, to distribute ICS to remote areas in Cambodia and possibly Laos, of which SNV may partake. This would present an extra income opportunity for the market players as well as those institutes providing service in the enabling environment.

### Laos

The customers will pay the full commercial price for the stove, which ranges from €5 to €8. The programme will leverage financial support for some of the poor households under the voucher system developed and implemented under a separate programme of SNV. SNV in cooperation with its partners developed a Gold Standard carbon initiative which is generating about US\$50,000 per year through the sale of carbon credits. Part of the revenue is used to establish a revolving credit fund to support producers to enhance their production quality and strengthen the capacity of workforces. The programme will also continue collaborating with government supported 'Governance, Forest Landscape and Livelihood (GFL) Programme which provided financial supports to 5,000 households to install ICS in the northern province of Huaphanh 2020.

### Nexuses

SNV will explore opportunities to further address nexuses within its own portfolio (including Energy, Agriculture and WASH) and to collaborate with likeminded organisations and programmes.

### Cambodia

SNV's experiences through many engagements with the government demonstrate how sub-national authorities levels are more keen to cooperate to address issues surrounding traditional cooking than the national level. Alignments are made explicit with the WASH sector where BCC is much more experienced in behaviour change and governmental involvement than in the Energy sector. The problems are showing profound similarities among sanitation and household air pollution. As such, taking advantage of best practices, the CCWC responsible for Open Defecation Free villages under WASH now agreed to assume responsibility for the roll out of the SFV campaign.

### Laos

The intervention strategy of the programme hinges on several cross-sectoral collaborations with the government and donor supported interventions in nutrition. The programme will continue to build upon the productive cooperation (awareness building, cooking demonstration, conditional voucher schemes) with development initiatives in agriculture & nutrition such as ENUFF; with two French organisation (Agrisud and Service Fraternel D'Entraide) in the north; as well as linking up to the new Biodiversity Conservation Corridor project (CARE/SNV consortium, ADB/MAF funded) in the far South. The programme will seize the opportunity to align with ENUFF programme to piggy-back cookstoves dissemination onto the health and nutrition awareness outreach activities.

Collaboration with the local NGO, Quality of Life Foundation (QLF), will further be nurtured to increase uptake of ICS in poor villages in the outback of Xieng Khouang Province. Collaboration with GFL project as mentioned earlier, and Community-based Inclusive Development

Project will continue to support households to install ICS their working areas. Additional opportunities for collaboration will be explored.

## 1.5.5 Modalities

### Approach

#### Cambodia

Cambodia changed from a supply focused intervention with RBF and business development support to one that stimulates demand on a localized basis. The reason for this change is that there are only few viable companies in the supply chain to collaborate with; It is therefore prudent to widen the scope of the supply by the inclusion of more shops and more technologies in the vicinity of SFV.

In 2020, it was already witnessed how business to business meetings at the SFV festivities led to collaboration where ABC are sold at the local shop on consignment. This structurally improves accessibility to clean cookstoves, as compared to the previous situation of mobile sales teams.

As part of the SFV, BCC community approaches are implemented through community dialogues and in-person one-on-one door-to-door follow ups, amongst others, as well as training and customer relationship building. The results of the BCC activities will be measured by the improvements demonstrated through the SFV logbooks and the uptake of clean cookstoves and/or SFV behaviours



*Photo: District Governor of Banteay Meas district as part of a panel judging the school wall painting, Cambodia EnDev 2021*

SFV interventions are linking demand creation through partners at district, commune, and village level – CC, VC, CCWC and health and school centre officials and pagodas with the supply chain. The SFV approach utilises an integrated model that leans on public private partnership where three parts come together: (a) demand creation for clean cooking by the governmental sector, (b) supply chain support through demand creation including ABC and ME (c) behavioural change communication to promote smoke free cooking habit.

With an eye on Endev’s strategy around transformation, innovation, inclusion and ME clean cooking, SNV started to develop a

novel behavioural change communication campaign as part of the SFV approach in 2020 in two provinces, expanding to four more with the Covid grant from EnDev, covering six provinces.

SFV ignites an intrinsic demand that is sustainable and different from commercial campaigns with short lived attractions and links the supply chain to this demand. SFV seeks for change in norms and is inclusive to any ME technology that is imported or locally made, including ABC. Demand deriving from this is lasting and transformational by nature.

*“We are very satisfied with this approach; we sell twice as much in SFV than other villages and our (female) sales teams in SFV feel empowered and rewarded by their successes. We also have a better entry to approach village authorities thanks to the introduction of SNV.”*

Daniel Walker, CEO of ACE.

The programme also supports online communication channels through social media and sales modality through e-commerce with the provision of leads of sales from its Smoke Free Village Facebook <https://www.facebook.com/SmokeFreeVillage>. Participating enterprises continue to receive support in boosting their e-commerce through their own Facebook pages.

## Laos

SNV's ICS initiatives in Laos are designed around a sector development approach, creating a multi-stakeholder platform involving government, private sector, NGOs, and consumers to collaborate and contribute for system change. Interventions were formulated keeping in view the four major impact domains related to health, environmental protection, resource management and employment generation. In line with sector development approach, the user-centred approach that aims at disseminating ICS which (i) can meet users' affordability, (ii) are familiar to end-users and (iii) can be produced with locally available materials and workforce; to the design and dissemination of ICS has ensured that the development of a final product is in line with the users' needs and means they are motivated to purchase and adopt the product. Another distinct feature on the supply side is that the ICS models are profitable and easy to produce. Also, the producers are not bound to only make ICS, but can partially make traditional stoves with the firm understanding these won't be labelled and counted. This freedom of complementarity and risk spreading is appealing for producers to participate in the franchise of high quality, labelled unsubsidized cookstoves.

The primary focus of the programme is on building capacity of supply (producers, distributors, retailers) and demand side actors (LWU, NGOs, Sectoral Projects) and advocating of enabling environment for different stakeholders to collaborate and bring synergy. Quality assurance and knowledge management through evidence-based advocacy will remain to be integral parts of the programme. Strong collaboration with LWU will be further strengthened to ensure effective BCC.

The justification of the approach is the proven successful formula that resulted in the operationalisation of 30 production centre and sales of 440,000+ ICS. The supply side actors - producers, distributors and retailers are found to have a profitability margin of at least US\$1 per ICS sold. EnDev only supports in areas where the market cannot yet function on its own, namely on quality control, M&E, and capacity building gaps of the partners.

In contrast, market development for high end Tier-4/5 stoves is not considered appropriate due to the high price point, and outperforming ICS, unavailability of appropriate fuel sources in the local market and a lack of peoples' awareness. Key determinants of households' choice of cooking energy in Lao PDR have moved to fuel availability and fuel pricing, along with ease of use, convenience, and cleanliness from predominantly price-orientation. The EnDev support has been instrumental in filling the affordability gap by introducing cost-effective technologies and BCC. The market-based approach refrains from end user subsidies.

### **Cost efficiency**

In Cambodia, the investments of EnDev are geared to CCWC to become empowered and enabled to provide BCC activities, to coordinate these efforts with the private sector and to keep track of the monitoring and to aggregate learnings and share this with the EnDev community and beyond.

In Laos, the intervention's strategy has been, and is, following a pathway of increasingly transfer of responsibilities to Lao actors such as DSTs for stove testing and quality assurance, LWU for BCC, ARMI for capacity building of value chain actors, and one where SNV gives support only where this is needed, and not to what it is used to. These needs have reduced over time and are now in stage SNV's focus is on innovations, replication, collaboration, and quality oversight.

## **1.5.6 Results**

### **Cambodia**

In Cambodia EnDev supports the market for ABC and ME stoves through its RBF facility under which 6 suppliers/manufacturers participate; 3 ABC and 3 e-cookers have a combined target of 3,000 stoves. RBF will be phased out by end 2021 in a transition to the demand based SFV approach.

In 2021, 5,000 innovative ceramic stoves models will be produced and sold through the association CESPAC with 15 selected producers, that receives institutional support from EnDev. EnDev will phase out its support end 2021 and per 2022 onwards, new funding may progress the ceramic stove industry<sup>26</sup>.

In the subsequent years, only ABC and ME stoves bought in the SFV campaign will be monitored with an expected 9,000 stoves purchased. This makes a total of 19,000 stoves across the programming period.

The results of the SFV are not only captured in quantitative targets but also by a change in knowledge, attitude and practices of household members that lead to clean cooking, and capacities and engagement of local authorities.

### **Laos**

The programme envisages to produce and sell 125,500 intervention ICS in four years to enhance the cooking conditions for especially the female population. Additional 214,500

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<sup>26</sup> SNV is exploring the opportunity to hand over the established capacities at CESPAC to serve a carbon project for ICS distribution, managed by CQC.

charcoal stoves (PTT) will also be disseminated by the same supply chain actors operational under the EnDev Programme. A total of 30 producers (50% female headed), 15 distributors (25% female operated), and 1,600 retailers (70% female operated) will be capacitated to provide quality products and services.

The stove test results indicate that the proposed REMI and WS2 stoves will save 46% and 56% of the firewood respectively in comparison to the commonly used baseline Tripod Stove. The PTT stoves for charcoal saves on average 28% charcoal in comparison to an already improved baseline model (Tao Dam). The viability of the dissemination of BCC and e-cooking will be explored depending on the new budget availability.

The major outcomes are stimulating behaviors and markets related to ICS - the commercial supply chain development and business support for producers of ICS for domestic and institutional use. Service provision of market development is done with a national NGO, promotional activities are provided through local authorities, Lao Women Union, and quality control by Ministry of Science and Technology and its provincial departments that operate the testing labs.

Programme results	Targets	[Other target dimensions/indicators]
People: Access to Electricity		
People: Access to Cooking	Additional target: (2021-2024) 31,555 (adjusted net figure as per OCS)	<ul style="list-style-type: none"> <li>-45 ICS and 3 ABC and 3 ME entrepreneurs</li> <li>-4 subnational governments capacitated in stove testing</li> <li>-24 provincial govt take responsibilities of BCC and promotional activities for clean cooking.</li> <li>-2 associations in Laos and Cambodia taking lead roles in ICS market facilitation.</li> </ul>
PU: Access to Cooking	Additional target: (2021-2024) 1,120 (adjusted net figure as per OCS)	<ul style="list-style-type: none"> <li>- At least 5 ICS production entrepreneurs will be producing and selling institutional ICS/medium sized ICS by the end of the project period.</li> </ul>

### 1.5.7 Sustainability

The design and intentions of the Mekong programme have a profound intension to arrive at systems change; on minimizing dependency, embedment of governmental services and to let markets to continue based on sound business principles.

#### Financial viability

##### Cambodia

The lessons of EnDev’s RBF interventions show how the nascent ABC market has been struggling to make businesses financially viable, scalable and bankable. One of the explanations for this is that the costs of closing sales deals with households are high in terms of time, effort, travel, costs that are exacerbated by the need for after sales and continues training. In this context, SFV helps to lower these costs as it creates an active demand for clean cooking in focussed areas, where households giving higher priority to clean cookstoves and fuels and



a geographical focus allows for managing client relations. As was recognised at the time writing, ACE managers sell twice as much in SFV than in other villages they have sales teams.

### Laos

The financial sustainability of ICS will be achieved through a proper trade-off between price and quality of stoves. The programme will support producers to manufacture various technological products (REMI, PTT, WS and Medium Sized stoves) so efficiently that they realize a fair profit margin while selling them in the market at a price that consumers can afford. Both the producers as well as the distributors/retailers will be assured of receiving a profitable business while being competitive in the consumer market. Seven more new production centers established under the framework of EnDev III will continued to be provide with technical backstopping and advisory services to enhance their production process that leads to financial gains.

### Institutional viability

#### Cambodia

Based on meetings held by SNV on national level with the Ministry of Mines and Energy as well as with the Ministry of Environment the interest is far greater on macro level and larger programmes. On the subnational level however, the interest is very profound and from that perspective SNV has established MoUs with the Commune Councils the SFV campaign is taking place. With the support of the field coordinators the institutional capacity building is taking shape.

Taking ODF interventions under WASH as the example, the process of ODF continued after the programmes ended in June 2020. Districts, communes, and villages that were declared ODF with SNV's support remaining ODF years after, with an ecosystem supporting these new norms. The mechanism is sustained by committees at village levels and received no financial incentives for ensuring sustainability of efforts as part of the exit strategy.

#### Laos

Institutional sustainability will be ensured through effective participation of stakeholders including related government agencies - REMI, taking responsibility for quality control and the local cookstove test laboratories in the provincial DSTs. The programme will strive for the ICS interventions to get ample space under the framework of energy action agenda and investment prospectus of the government through evidence-based advocacy. Strengthening the capacity of the private sector (30 producers, 15 distributors, 1600 retailers) and implanting the notion of entrepreneurship development will help sustaining the interventions. Additionally, the programme will strengthen the capacity of association of stove producers and distributors to allow members to exchange ideas and knowledge about their stove businesses as well as advocate for level playing field for themselves.



*Photo: Roadside shop selling ICS offered without subsidy, SNV Laos*

Collaboration with Lao Women Union will result in the integration of ICS activities in their routine development portfolio. BCC, through cooking demonstrations and household dialogues amalgamated with their routine visits will continue to expand the market and increase the uptake of ICS.

## **Ecological sustainability**

### **Cambodia**

Cambodia is a country without proper waste disposal systems in place, there are no recycling companies and hardly any enforcement against environmental polluters on household or industrial level. Except for the ACE stoves there are no batteries. Setting up waste management systems would serve an eminent need but goes beyond the scope of the programme with no active players available in the recycling industry in Cambodia.

### **Laos**

Important improvements are made at the production level as all the 30 producers are being supported to construct and operate fuel-efficient and low polluting kilns to bake ceramic stoves. Design changes will be disseminated among the producers.

Another focus in the programme will be on black ash or char, which is needed as part of the clay mixture to produce ICS. Sometimes this is made from heaps of smoldering rice husk, whereas solutions can be offered when oil drums are converted to gasifiers which is reducing the smoke to almost none and provide high quality char.

The ICSs are produced using locally available resources and materials. As per the visual observations and formal/informal consultations with users, these ICS do not pose any environmental risks rather reduces its ecologic footprint even more by the need of less stoves over time due to a superior lifespan compared to the baseline stoves that require a similar quantity of resources to make.

## **Technological sustainability**

### **Cambodia**

Many impact studies around the world demonstrate that clean cookstoves are not reaching desired impact due to recurring factors including habits, inappropriateness, and technical shortcomings with regards to heat delivery and damage. In this context, the intervention is founded on the theory that an integrated approach focusing on both demand and supply by local authorities is ensuring a desire to clean cooking which is concurrently promoted by BCC efforts, creating a lasting demand and supply and a behaviour ensuring usage, including willingness to adopt the stove.

Through a systematic M&E framework of data collection and activities, the % of households cooking (indicator SDG 7.2) with clean cookstoves can be measured and evaluated through an adequate M&E system.

Another technological challenge is related to the need for after sales service (ASS) especially ABC/forced draft gasifiers to offer repairs and user re-training. The SFV campaign focusses







on dedicated areas making it feasible to offer these services as compared to when there are large distances between each of the customers. SFV also enables maintaining closer customer relationship building for neighbors without needs for ASS.

### Laos

Technical sustainability will be ensured through design optimization of stoves (based upon the outcome of the testing and R&D results), capacity strengthening of producers and distributors, compliance of quality standards and quality control (quality management will not limit itself to direct technical aspects only, but will include a promotional message), user satisfaction, and enforcement and compliance of after-sales services. REMI will be supported to play an instrumental role in testing ABCs and conducting R&D as and when needed.

The stove models to be disseminated under the framework of EnDev programme - REMI metal stoves and, WS3 and PTT4 ceramic stoves are fabricated by locally trained persons in local production centers.

Stove Design	Photo	Savings compared to baseline (%)	Baseline stove model	Test protocol	Testing agency	Year of Test
WS3 wood		56	Tripod	CCT	Renewable Energy Institute MoST	26 April 2019
WS3 charcoal		30	Tao Dam ceramic	AWBT	Renewable Energy Institute MoST	2019
REMI wood		46	Tripod	AWBT	Renewable Energy Institute MoST	2019
PPT 4 charcoal		28	Tao Dam ceramic	CCT	Renewable Energy Institute MoST	20 February 2019



*Photo: Roadside shop selling ABC with banner explaining fuel savings, SNV Laos*

The WS3 stoves are put to the test at village cooking demonstrations, to show the difference to the households. These manifestations show consistency of 60% firewood savings when cooking local meals, which in turn triggers demand for these stoves from both end users and from interested local retailers. These testing made available in simple messages for commercial purposes so that the customers can make an informed choice, as presented in the banner at this shop.

Given that a strong component of the SFV approach is about behaviour change, households that benefit from changes in their cooking behaviours and from the adoption of clean cookstoves are expected to continue to practice the same given that these benefits result in economic benefits, time, health and convenience. By making the SFV approach a local government initiative – involving the CCWC, CC, VC, SFV committee, health and school authorities; and the revered monks - the efforts remain socially sustainable going forward beyond the programme life, creating an enabling environment for suppliers to operate in. The BCC initiatives as part of the SFV approach focuses on creating a sense of pride and makes SFV aspirations for communities, thereby ensuring that the efforts not only have local acceptance but becomes an aspiration mandate both for households and communities and local government authorities.

In its efforts to be socially sustainable, the SFV approach includes PWDs and the poor in the programme, and the SFV related BCC activities will ensure the following changes:

- Improve knowledge and awareness of communities on disability and barriers to access including for the poor.
- Include PWD and the poor in decision-making processes including BCC activity planning and implementation at local levels.
- Improve the capacities of service providers, especially at the commune and district levels, to address inclusive and accessible SFV programming and implementation.
- Barrier free accessible and cost-effective models in kitchen environments for clean cooking, that factor in the special needs of the PWDs and the poor as far as possible.

At the commune and village levels, meetings will be arranged at convenient times for PWDs, at accessible locations and their participation will be proactively sought. If visual media are used, it will be ensured they are described verbally to those with difficulty seeing, and verbal presentations supplemented with visuals for those with difficulty hearing. In case it is found PWDs are hesitant to speak in open meetings, additional meetings to ascertain their needs and participation will be arranged.

## Laos

Social sustainability will be achieved through effective demand side management through behavioral change communication, cooking demonstrations, compliance of a quality assurance protocol, creating demonstration effects, ensuring optimal use of ABCs, ensuring positive word of mouth promotion from satisfied users, and periodic cooking demonstrations. The role of Lao Women Union (LWU) will be instrumental in ensuring social sustainability through integrating ICS activities into their routine development activities.

## Exit Strategy

### Cambodia

Given the former WASH committees now serve as the SFV committees, it is envisaged that they will ensure sustainability of efforts beyond the project date towards ensuring villages remain smoke free and the health-related behaviours are practiced. This will serve as an institutional mechanism for sustainability beyond the project period. Furthermore, given the government functionaries – the CCWCs and CCs, VCs, health and school authorities; and monks – will be an integral part of generating demand for SFV and linking this demand to the supply

chain and monitoring the same, it is envisaged that they will continue to lead these efforts with the SFV concept embedded in the government’s local leadership initiatives instilled through the project.

Given the SFV approach is appreciated by the MRD, it is expected that similar to WASH, inroads will be made to policies that ensure that it becomes the MRD’s mandate going forward, and towards the adoption of “model” villages – with villages achieving both ODF and smoke free status, and the convergence of rural development initiatives in these villages.

### Laos

The key to exit will be the realisation of a profitable fuel savings cooking sector, underpinned by a viable business case that ensures profitable business for producers, distributors, retailers, and clear benefits for end users; the assurance of enabling environment for private entrepreneurs to operate is needed to ensure quality. Having value chain actors with access to good market intelligence and capacity to deliver quality goods and services will form basis for a ‘safe’ exit. The project will realise this through accomplishment of capacity building, private sector development, and institutional development support. The proposed association of producers and distributors will be strengthened to ensure effective supply-side management and evidence-based advocacy.



*Photo: Lao Women Union promoting ICS at a fair, SNV Laos*

On the financial level, certain key services such as quality control, training and coordination are bound to be continued to be offered through the local NGO ARMI in collaboration with the Ministry of Science and Technology and LWU. These services will be financed from the revenues of carbon credit sales.

## 1.5.8 Gender Strategy and Safeguards

### Gender strategies

In Cambodia and Laos SNV executed a Gender Screening analysis by gender experts by methods of desk study, field surveys and intra organizational assessments. The conclusions and recommendations of these reports per country are summarized below to inform the gender strategy in the Mekong programme.

### Cambodia

The programme through the BCC component of the Smoke Free Village approach, will, by design, expose both men and women to positive role models that highlight equality between the sexes. As demonstrated through SNV’s WASH programmes in Cambodia, this will strengthen women’s ability to take decisions in the household and the community. Furthermore, this will also reduce the time burden borne by women in procuring fuelwood and this time saving can lead to potential income gains and improved health benefits. Cooking environment issues are a particularly favourable entry point to increase women’s empowerment. This potential, however, is limited if not accompanied by an improvement in women’s ability to manage assets and to independently procure financial services, most notably for male-headed households. To address, the programme will ensure the following changes:

- Through proactive consultative processes, ensure women’s leadership is inculcated both at the planning and implementation levels in the programme – the CCWCs leading SFV and BCC activities and action plans, which has been the main successful modality of generating demand for WASH products (latrines and water filters) by SNV in Cambodia;
- Through capacity building and coaching, promoting the role of women-led stove businesses - ensuring access to women-led businesses have access to and can benefit from the BCC efforts, and promoting female sales agents as was done for WASH.
- Through active engagements, ensure women are involved in the demand creation of clean cookstoves and promote behaviour change towards a clean cooking environment - the requirement of a female membership for every SFV committee (as is for the WASH committees) tasked with demand generation, and promoting behaviour change.

A focus area for the project will be to promote women’s leadership in energy at all levels, including supporting the role of women-led enterprises, which has already been successfully tested and developed through SNV’s work in Cambodia. In Cambodia, the project has a particular focus on growing women’s businesses and leadership; and engages women in demand activation through BCC and household dialogue approaches. Within the supply chains of the emerging industry for higher-tier biomass cookstoves in Cambodia, sales and managerial roles are dominated by women, and business models are set up to offer women-friendly job opportunities. The gender differentiation in subnational authorities, household’s decision making, and sales agents will be monitored.<sup>27</sup>

## Laos

In Laos, the Gender Screening conducted by external consultants states that despite the fact that the programme has done great work to engage women and men equitably women’s leadership as entrepreneurs can further be expanded on in the planned follow-on programme. While women’s participation in different parts of the value chain is already ensured with great success, programme reporting has not made clear if that also leads to increased representation of women, particularly in decision-making forums.

The report also suggests in-depth impact studies may help policy development in the sector to become more gender sensitive and recommends that further behaviour change measures will have to (continue) to address the health impacts of IAP, cultural attachments to cooking with wood and charcoal, and the pattern of buying cheaper quality stoves to save money.

As recommended by the report, the Programme will focus on institutionalizing gender mainstreaming capacity within the programme and its partners and track the performance on various gender issues. The programme will collect, analysis and share gender disaggregated data and information such as:



- Jobs generated for men and women – at least 50% women
- Number of stoves sold by male and female sales agents – at least 50% women
- Number of female sales agents trained by the programme on sales technique and end-user training - at least 50% women
- Time saved for women from fuel collection, pot cleaning, and reduction of cooking time - saving of at least 30 minutes per day per households

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<sup>27</sup> Gender analysis for Cambodia are being finalized with GIZ experts and will be integrated in the activities planning per end March 2021.

# 1.6 Democratic Republic of the Congo (DRC)

## 1.6.1 Summary and key data

Promoted technologies	 		
Summary of proposed intervention(s)	<p><b>Cooking</b> EnDev efforts will build on 2020 activities, approaches and lessons learnt and will be primarily concentrated on strengthening the availability, awareness, acceptability and affordability of two local ICSs models targeting households living in Kalemie, Bunia and Idjwi Island (East Congo). After consolidating the approach and instruments for the local ICSs (transitional) market enhancement, during the last two programming years, EnDev will pilot the introduction of higher tier stove types. Interventions include:</p> <p><b>Training, BDS +</b></p> <ul style="list-style-type: none"> <li>Increasing number, assets and skills of local producers through technical and business management training and coaching</li> <li>Enhancing distribution channels through TA on business model development, marketing and sales for producers and distributors</li> </ul> <p><b>Access to Finance</b></p> <ul style="list-style-type: none"> <li>Promoting ICSs affordability through value chain vertical integration, sales increase (economies of scale) and efficiencies promotion and through access to finance leaning on existing initiatives (VSLAs, women associations, MFIs)</li> </ul> <p><b>Evidence, learning transfer, innovation</b></p> <ul style="list-style-type: none"> <li>Increasing awareness through demand activation initiatives and behaviour change campaigns, exploring the critical role of women in demand creation</li> <li>Addressing gender barriers to improve women ability to participate in the sector</li> <li>Realization of pilot distribution + market test for high tiers stoves</li> </ul> <p><b>Partnerships and alliances</b></p> <ul style="list-style-type: none"> <li>Sharing best practices with LAs, local CSOs and through coordinated activities with the sector's main donors (UNCDF, WWF)</li> </ul> <p><b>PUE - Productive use of energy</b> The proposed intervention aims at increasing the number of new or existing businesses and farmers on Idjwi island that use electricity productively and from renewable off-grid sources</p> <p><b>Training, BDS</b></p> <ul style="list-style-type: none"> <li>Training and coaching for MSMEs in business and management skills</li> <li>Facilitating B2B agreements between equipment providers and suppliers</li> <li>Run fairs for MSMEs with product suppliers and financial organizations</li> </ul> <p><b>Access to Finance</b></p> <ul style="list-style-type: none"> <li>Develop a matching grant scheme to support entrepreneurs in purchase PUE appliances and equipment</li> <li>Build capacity of financial service providers</li> </ul> <p><b>Evidence, learning transfer, innovation</b></p> <ul style="list-style-type: none"> <li>Documentation of the lessons learned to be shared with relevant stakeholders in the off-grid energy value chain (e.g. ASER, ACERD)</li> </ul> <p><b>Partnerships and alliances</b></p> <ul style="list-style-type: none"> <li>Close collaboration with partners of AVSI in existing energy interventions, i.e. Ministry of Energy, Province of Bukavu, ASER, ACERD</li> </ul>		
	Quantitative targets [# of]		Further relevant impacts/outcomes
Cooking / thermal energy for households	98.812	People	<ul style="list-style-type: none"> <li>+12 MSMEs engaged in local ICSs production</li> <li>20% HHs use an ICS in the 3 targeted locations</li> <li>+20%M, +50%W enrolled in ICSs value chain</li> </ul>
Energy for productive use	51	MSMEs	<ul style="list-style-type: none"> <li>80 individuals or groups of entrepreneurs/farmers provided with business and financial skills (50%W)</li> </ul>
Project period	01.01.2021 – 31.12.2024	Indicative Budget	€ 1.515.646 <sup>28</sup>

<sup>28</sup> Excl. 10% GIZ overhead



## 1.6.2 Theory of change (ToC) and state of market

### Cookstove market

The *Centre d'Études et de Recherches sur les Énergies Renouvelables* (CEREK-ISTA) of Kinshasa estimated in 2014 that traditional fuels (firewood and derivatives) represent 93% of the total energy consumed in DRC; this figure reaches 98% when considering only households. In 2020, UNCDF confirmed that these figures had not significantly changed: “more than 90% of the population in the DRC rely on firewood and charcoal for cooking”<sup>29</sup>.

DRC has no specific policy on clean cooking sector, and simply mentions within the targets of its National Agenda “access for all men and women to electricity and clean cooking”. Nevertheless, focus is growing also thanks to programs and agencies as FONAREDD and UNCDF/UNDP.

EnDev intervention started at the beginning of 2020 from East DRC (Provinces of North-Kivu, Tanganyika, South-Kivu and Ituri) in order to exploit AVSI long-time presence (since 2002) and reach. Although we are speaking about one of the most difficult contexts in terms of insecurity, political crisis and socioeconomic vulnerabilities, there were favourable conditions for EnDev engagement. On one side, some urban agglomerations constituted an interesting and logistically accessible potential market for ICSs if compared to the impressive magnitude of the DRC territory and the huge logistical difficulties in operating in the centre, south and north parts of the nation. On the other hand, in Tanganyika, in north and south Kivu some artisans were trained and supported to produce ICSs as a result of past programmes (e.g. WWF project) terminated few years before. Almost all of these producers needed support in increasing ICSs production and standard quality, in becoming formally registered businesses and learn how to operate a commercial entity, and in financial management.

According to AVSI pre-assessment (2019), in the four main cities of the area (Goma, Kalemie, Bunia, Bukavu) and in the island of Idjwi, only one structured producer (Goma Stove) remained fully operative in Goma, while producing an ICS model that respected minimal quality standard and granted at least 30% charcoal savings. Goma stoves had a very limited distribution also in Bukavu and in the northern part of Idjwi Island. In Kalemie, Idjwi, Bukavu and Bunia there were no relevant ICSs producers, but 27 artisans that produced “fake” ICSs models almost all inspired by the Goma Stove with an overall production capacity of 3.000 units per month.

According to EnDev ICSs market assessment (October 2020), each location owns a peculiar socioeconomic profile leading to different cooking stove market situations. Within Goma’s low income areas (more than 200,000 HHs), 60% of the HHs use charcoal traditional cook stoves; 25% firewood; 10% Goma Stove ICS; 5% gas or electricity. In Bunia there are approx. 55.366 HHs within the targeted informal settlements (where almost 100% of the population cook with biomass); each HH is composed by 7.9 members and has an average monthly income of 195 USD; charcoal is by far the main cooking fuel (91,4%); the main barriers toward the development of a sustainable ICSs market are: consumer’s lack of awareness about benefits and false perceptions, unavailability and price volatility of raw materials for production. In Idjwi

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<sup>29</sup> <https://www.uncdf.org/article/5341/what-does-the-clean-cooking-market-look-like-in-the-drc>

Island live approximately 55.373 households with 6.6 members each and a monthly income of 90 USD; the main cooking fuel is firewood (59,9%); main barriers are: high cost of raw material, HHs low income; resistance to change from the Pygmy community. In Kalemie, the potential market for ICSs counts for approximately 67.231 HHs with 6,6 members each; HHs average monthly income is 154 USD; the main cooking fuel is charcoal (84%); main barriers: lack of ICSs availability and HHs awareness, HHs dependence from humanitarian aid including subsidized ICSs distribution.

Since the start-up of the project in February 2020, EnDev priority has been the one of improving the supply side. To that purpose we focused on improving and disseminating clear quality standard for the same model produced by Goma Stove, now branded “*Jiko Nguvu*” (= Power stove). After coordinating with UNCDF, to avoid overlapping and double counting on ICSs promotion, EnDev decided to focus its interventions in three locations (Kalemie, Idjwi island and Bunia) while UNCDF would concentrate its effort in Goma and Bukavu. Covid-19 prohibited the implementation of all the activities foresaw in the EnDev programming process 2019. The first EnDev promoted ICSs were produced and sold only in December 2020, also building on artisans that formerly produced “fake” ICSs.

For the period 2021-2024, considering the limited budget and the still nascent clean cooking market, it is proposed to build on 2020 activities, approaches and lessons learnt. EnDev efforts will be primarily concentrated in strengthening the availability, awareness and affordability of *Jiko Nguvu* stove (clay liner + metal jacket, min. 30% fuel savings compared to the baseline, i.e. traditional charcoal cook stoves) in the suburban areas of Kalemie and Bunia, but also in Idjwi Island. In this last location, to address the 60% of the consumers that use firewood (3-fire-stone or simple traditional ceramic stove). Thus, AVSI will also support the introduction (production and distribution) of a ceramic ICSs, namely the well-known *Canarumwe* ceramic stove (Rwanda) also referred to as *Chitetezo Mbaula (Malawi)*, that has already been tested and distributed by EnDev in many African countries.

As per market assessment and lessons learnt from last year implementation, to enhance ICSs supply in the area, the approach selected for the programming 2019 (i.e. only one producer per city/location = 3 in total) has shown to be insufficient. For this reason, in 2020 EnDev already supported 6 producers. Moreover, distribution and affordability promotion could not be exclusively based on vertical integration (i.e. direct sales from producers) and economies of scale. New producers (and possibly new locations) should be engaged and distributors (retailers, point of sales, and wholesaler) should be supported as described in the ToC table and in chapter five. On the demand side, EnDev priority efforts will be focused on (i) massive ICSs awareness raising and behavioural change campaigns bearing in mind the transitional aspects of the promoted solutions (*Jiko Nguvu* and *Canarumwe* stoves); (ii) ICSs affordability promotion. Please refer to chapter five and ToC table for detailed activities and instruments.




After consolidating the approach and instruments for ICSs (transitional) market enhancement, during the last two years of the period, EnDev will pilot the introduction of an industrialized imported charcoal cook stove (e.g. *Jikokoa* from Burn) and realize a market test with electric pressure cookers in Goma or in areas where AVSI and/or partners are implementing rural electrification projects through solar mini-grid (e.g. Idjwi Island). These pilot and test will allow to understand the potential market for the mentioned higher tiers cooking solutions and to



identify strategies and supportive interventions for a possible scaled up distribution in the next EnDev programming phase.

For enabling environment, partnership and synergies, please refer to the dedicated sections.

## Theory of Change - EnDev DRC COOKING

<b>Impacts</b>	<b>Energising Lives - Social development</b> - Increased HHs purchase power for basic needs other than cooking fuels - Improved health (women, children) - Improved gender equality - Increase sustainable consumption 	<b>Energising Opportunities - Economic development</b> - Increased MSEs productivity and profitability; - Increased job creation, technical and business skills 	<b>Energising Climate - Combating climate change</b> - Reduced GHG emissions - Reduced forests degradation - Improve climate change awareness 
<b>Assumptions</b>	- Producers and distributors continue to expand their ICSs/clean cooking business - HHs purchase good quality ICS and replace worn-out ones with new ICS		
<b>Outcome</b>	Increased ICSs and clean cooking solutions' adoption rate by households across a larger area in East DRC		
<b>Assumptions</b>	- HHs and businesses buy or invest in cleaner cooking solutions - No pandemic major outbreak, no major political, financial or institutional instability or security problems - Supportive or neutral attitude by government and local authorities vis-à-vis the ICSs market and NGOs operations - ICSs producers and distributors respect all fiscal, legal and human rights frameworks - Government and agencies (e.g. UNDP/UNCDF) allow AVSI to provide EnDev contribution in term of enabling environment		
<b>Outputs and results</b>	- Increased local production capacity, availability and visibility of quality ICSs and clean cooking solutions - Improved consumers awareness and increased demand for cleaner cooking solutions - Increased women enrolment into the ICSs and clean cooking value chains and participation toward ICSs adoption by HHs		
<b>Key interventions</b>	<b>Enhancing supply-chain</b> - Result based support for production equipment and material for local ICSs - Technical assistance (coaching and training) for local ICSs production optimization encouraging women participation - Basic business and entrepreneurship training and coaching (including business plan elaboration and management, legal and fiscal aspects) for local ICSs producers prioritizing women engagement - Expand the range of the offered clean cooking solutions (firewood ICS, e-cooking test and pilot distribution of imported higher tier ICSs) - Distribution channels enablement for ICSs and clean cooking solutions - Improved marketing approach for ICSs/clean cooking producers and distribution	<b>Demand activation and development</b> - Massive awareness raising and behaviour change campaigns also targeting women enrolment into the messages dissemination and promoting women involvement into the HH decision making process. - Support HHs access to credit and affordability to clean cooking solutions	<b>Partnership and synergies</b> - Coordination and collaboration with UNCDF / FONAREDD sharing information, lessons learnt and technical knowledge; targeting complementary areas; contributing to local authorities capacitation and to advocacy with government - Coordinating with WWF and other partners that promote the consumption of sustainable charcoal ( <i>eco-makala</i> ) - Strengthening local authorities' awareness and capacity through TA when possible and requested - Facilitating the negotiation between <i>Jiko Nguvu</i> stove producers and agencies that support clean cooking promotion in humanitarian settlements; - Training AVSI's (and possibly other actors) staff from other sectors concerning clean cooking benefits and behaviour change triggers
<b>Barriers</b>	<b>Supply side barriers</b> - Low availability of quality production equipment and materials; - Lack of capitals and limited access to credit to buy production equipment; - Limited entrepreneurial and business management skills; - Volatile costs of the raw materials; - Limited scalable business models; - Poor technical skills & quality standard; - Poor marketing approach and skills; - Lack of transport means for goods; - Import procedures and costs for industrialized high tiers stoves; - Very low access to electricity rate and grid instability.	<b>Demand side barriers</b> - Very limited purchasing power and savings attitude by HHs; - Daily driven expenditures by HHs; - Lack of awareness about ICS benefits and traditional cooking risks; - Behaviour change resistance due to traditional cooking habits; - Low education to evaluate and perceive ICS benefits; - Very limited access to credit; - Distance from clean cooking solutions point of production/sale (lack of transport).	<b>Enabling environment barriers</b> - Poor policy framework; - No standards for improved cook stoves and clean cooking; - Scattered fiscal framework for small - artisanal producers and distributors; - Difficulties in procuring quality services, equipment and raw materials on local and external markets; - Difficulties in products, services and people mobility due to social instability, insecurity and pandemics.
<b>Assumptions</b>	Current private sector strategies, technical and financial capacities do not permit the fast development of the local production and the widespread dissemination (including massive awareness raising and promotional campaigns) of cleaner cooking solutions among households.		
<b>Root cause</b>	- Poor availability, visibility and quality of affordable clean cooking and improved cook stoves solutions due to the limited number of local producers and their limited production and distribution capacity; - Poor awareness among HHs concerning risks associated to traditional cooking and the benefits of cleaner cooking solutions. - Very low daily income levels of the large majority of the population		
<b>Core problem</b>	The large majority of poor households in East DRC still rely on traditional cooking methods (firewood in rural and charcoal in urban areas) that contribute to greenhouse gas emissions, deforestation, respiratory diseases especially for women and children and to armed groups financing (they produce and sale charcoal from Virunga and other forests)		

## Productive use of energy

According to World Bank data (2017) only 17% of the population in DRC has access to electricity, 0,4% in the rural areas (one of the lowest rates in the world) and 47.2% in urban areas. Of this energy only 20.5% is consumed by the industrial sector in a productive way, 77% is used for the residential sector, making while 2.4% is used for agriculture, transport & public services all together. Productive use of energy<sup>30</sup> (PUE) is very low especially in rural areas irrespective of whether on- or off-grid electricity is available. The main obstacles are insufficient energy finance, poor availability and affordability of quality and energy efficient appliances and lack of adequate skills by end users to make productive commercial use of energy. Insufficient finance is one of the main challenges undermining the success of productive use of energy initiatives. Lack of collateral security, lack of audited books of accounts and financial institutions regarding micro and small enterprises as high risk borrowers, are the main challenges entrepreneurs face together with the high interest rates eroding the business margins. Similarly, suppliers of quality appliances are absent from the rural areas which mainly rely on locally produced and highly inefficient machineries.





The proposal will primarily focus to operate in the island of Idjwi that has been chosen together with the authorities because being an island is potentially attractive for private sector investment in off grid energy generation. Moreover it is one of the most peaceful and safe places within north and south Kivu (war was never experienced on the island). It has a population of 285161 persons, vibrant economic activities in the agriculture (main crops cultivated are cassava, mais, beans, soya, ground nuts, coffee, sweet potatoes, bananas, pineapples, sun flowers, mangos, avocados, oranges and lemons), fishing, and trade though there is limited value addition because of lack of power; and an estimated demand of almost 1 MW has been identified in a field assessment conducted by AVSI in November 2018 in 12 villages. For the above reasons the island is ideal for off-grid power generation and can attract private sector investment which is still not very common in DRC and especially in east DRC because of the high country risks.

Form a recent assessment conducted by AVSI on Idwi Island, there are no formal finance or microfinance organizations/institutions on the island (the closest organizations being represented by commercial banks in Bukavu) and the providers of quality appliances and stand-alone PUE systems are not aware of the business potential in Idjwi and don't have any outreach on the island. These are the main market/sector challenges that the TOC detailed below will address.

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<sup>30</sup> In this document PUE is defined 'Agricultural, commercial and industrial activities involving energy services as a direct input to the production of goods or provision of services' [https://energypedia.info/wiki/Productive\\_Use\\_of\\_Electricity\\_from\\_Mini-grids](https://energypedia.info/wiki/Productive_Use_of_Electricity_from_Mini-grids)

## Theory of Change - EnDev DRC PUE

<b>Impacts</b>	<b>Energising Lives - Social development</b> - increased access and affordability of agriculture value addition leading - increased HH income - Improved gender equality   	<b>Energising Opportunities - Economic development</b> - increased rural productivity - increased SME s productivity - increased economic growth - increased rural employment - reduced migration of the rural poor to urban areas. - Increased job creation, technical and business skills  	<b>Energising Climate - Combating climate change</b> - Reduced GHG emissions  
<b>Assumptions</b>	- Private sector developer continue investing in expansion of mini-grid clusters in the targeted areas - An enabling environment is guaranteed by the Province of Bukavu and the National Ministry of Energy to support the expansion of off-grid rural electrification		
<b>Outcome</b>	Increased energy access for MSMEs: increased number of new or existing businesses and farmers that use electricity productively from renewable sources		
<b>Assumptions</b>	- Efficient and quality electrical appliances are available in the country - Businesses and farmers use and replace modern energy services products - No pandemic, instability or security problems		
<b>Outputs and results</b>	- Professionalised market actors with technical/business skills for distribution, retail, financing of modern energy services and products - Increased consumers demand for high quality energy services and products		
<b>Key interventions</b>	- Assess existing and potential productive businesses opportunities - Train at least 80 individual or group entrepreneurs (new or existing) in business and financial skills - Provide specialized coaching to entrepreneurs - Develop a matching grant scheme to support purchase of electric appliances and equipment - Assess and profile existing financial services and financial opportunities - Build the capacity of financial service providers to offer financial services in the Energy value chain - Identify energy efficient equipment and machinery providers and suppliers - Facilitate B2B agreements between providers and local suppliers		
<b>Barriers</b>	<b>Supply side barriers</b> - Limited scalable business models; - Poor marketing approach and skills; - limited ability to mobilize investments - poor knowledge/understanding of the business case for offering products/services in the renewable energy value chain - lack of capacity/resources to reach the last mile consumers	<b>Demand side barriers</b> - Limited entrepreneurial skills and financial resources; - limited knowledge of the existing businesses opportunities - Untapped potential for promoting productive use of energy - Very limited access to business finance - lack of knowledge of energy efficient products market	<b>Enabling environment barriers</b> - Poor policy framework; - Poor availability of quality energy efficient appliances - No standards for quality appliances - Unclear fiscal framework; - Difficulties in procuring quality services, machineries, tools and raw materials on local and external markets; - Difficulties in products, services and people mobility due to social instability, insecurity and pandemics.
<b>Assumptions</b>	Current private sector strategies, technical and financial capacities do not permit the fast development of bankable and scaleable business models for modern energy services and products		
<b>Root cause</b>	Growth in rural electrification is currently dependent on scarce public investment in main grid extension and off grid privately provided solutions fail to catch on because of poor market information, high distribution costs, poor access to finance high country economic risk and insecurity		
<b>Core problem</b>	According to World Bank data (2017) only 17% of the population in DRC has access to electricity, 0,4% in the rural areas (one of the lowest rates in the world) and 47,2% in urban areas. The poor access to modern energy services and products constitute a significant limitation for social and economic development in the targeted areas.		

## Covid-19

Due to East DRC vulnerable context (armed groups, poverty, Ebola, etc.), Covid-19 is not perceived as the main risk by the population. Field activities has never been totally interrupted in the three locations because AVSI has there filed offices with local staff. Major problems has been experienced from February to June 2020 when all flights and travels between the project locations and AVSI HQs in Goma have been prohibited. Consultants could not travel or were not available to work. Some AVSI expatriated staff (including EnDev project manager) were evacuated to Europe in June. The new project manager could only reach Goma in October 2020. The Rwanda border has been intermittently closed for almost one year causing difficulties in material and equipment provisions. Obviously, a Covid-19 outbreak can affect activities implementation and for that reason, a warning has been placed in the assumptions' section. AVSI staff is complying and will comply with the restrictions and guidelines established by the GoDRC and the internal Health & Safety policies (protections, internal and communities' meetings, HHs visit, personal care, etc.). Obviously, if a lockdown or a travel ban is established, activities implementation would be affected (field work, missions by external consultant, ICSs production and sales etc.) although procedures are in place to mitigate all these impacts (smart working, digital communication, field offices activation etc.).

### 1.6.3 Transformative character

#### Cooking

##### Market development

The ICSs value chain is still at a nascent stage in East DRC. The proposed intervention will continue to strengthen local ICSs value chain by increasing availability, awareness, acceptability, convenience and affordability, by improving and disseminating best practices, technology, knowledge and expertise around ICSs sector on providers (producers and distributors) and consumers' side. The proposal will benefit from the Market assessment performed in 2020 by AVSI in the three targeted locations (Kalemie, Idjwi island and Bunia) where, in average, over 96% of the HHs are relying in fuel or charcoal for cooking, and where approximately 84% of the household are using inefficient traditional cooking methods while the remaining 16% use a fake ICS - inspired by the above mentioned Goma stove - that is far to comply with the EnDev fuel savings minimal requirement<sup>31</sup>. At least 12 producers and 28 distributors will be empowered toward the sustainable management of a "real-ICSs" (*Jiko Nguvu* and *Canarumwe*) business. Massive awareness and behavioural change campaigns will target households leaving in urban and peri-urban settlements of Kalemie and Bunia and in villages in Idjwi Island. EnDev will also address HHs affordability and contributing to enable the ICSs business environment not only for local ICSs but also for future investment in high tiers cooking solutions. For additional details concerning market development modalities and impacts, please refer to Chapters 2, 4, 5 and 6.

##### Economic development

The increased local ICSs production and distribution require and will lead to additional human resources (job creation); additional technical and business skills (vocational training); improved MSEs (producers and distributors) productivity; increased of raw materials, equipment, services (local demand) supporting directly the local economic development in the targeted

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<sup>31</sup> ICSs market assessment in Kalemie, Bunia and Idjwi Island - EnDev, 2020

locations. ICS value chain will generate jobs in particular for women and youths without qualification and will provide them with an expertise (Vocational training and job creation). Moreover, HHs savings in time and fuel cost (40% firewood and 30 charcoal compared to the baseline) could be invested in strengthening or starting up income generation activities. This last impact can be reasonably assumed but cannot be directly linked to project activities and measured. Finally, piloting higher tiers and e-cooking solutions, EnDev will create premises for another step toward local development and new jobs creations. For additional details concerning economic development modalities and impacts, please refer to Chapters 2, 5 and 6.

### **Social Development**

The increased adoption of ICSs by HHs in the targeted locations will lead to social development in relation to health (reduced indoor air pollution, although limited for firewood ICSs), gender related issues (reduced time in cooking, involvement of women and women's groups in ICSs related activities - i.e. production, distribution, access to credit, promotion and sales). For additional details concerning social development modalities and impacts, please refer to Chapters 5 and 6.

### **Poverty alleviation**

ICS adoption will allow households to save at least 40% of the cooking fuel per month with *Canarumwe* stove, 30% with *Jiko Nguvu* stove and 50% with *Jikokoa* stove. This fuel consumption savings could lead to fuel expenditure savings. ICS will also create economic and employment opportunities along the value chain (see above). Finally, activities focusing on refugees are also planned in synergies with current AVSI humanitarian interventions.

### **Productive use of energy**

#### **Market development**

(Developing a market for energy access technologies, mainly relating to household access) Thanks to i) the capacity building of financial service providers to offer financial services for PUE appliances (mostly AC); to ii) the B2B agreements that will be facilitated between the financial services providers and the providers of quality and efficient PUE appliances; and iii) the empowerment of local users of PUE products through capacity building and access to finance, the project will contribute to develop a market for energy access technologies and for their productive utilization.

#### **Economic development**

(implying an orientation towards higher tier access which consequently is not a separate aspect).

Thanks to the promotion of PUE through access to finance and to quality appliances the number of businesses and their turnover in the selected areas of intervention is expected to grow causing an increase in economic development. Key economic sectors will be targeted in order to guarantee maximum impact such as value addition in the agriculture value (value chains with potential for development in Idjwi are among others maize, milk and poultry).

#### **Social Development**

Thanks to the availability of new products and services in agriculture value addition, the local farmers will be able to add value to their agricultural product and therefore to sell them at a higher price with a positive impact on the households' income. The increased accessibility of services, previously geographically distant, will moreover lead to increased household's

savings and the availability of extra time for other activities. The increased incomes and savings are expected to lead to a higher availability of funds for household expenditures in nutrition, health and education therefore leading to social development. Finally, the newly promoted small enterprises are expected to lead to additional employment in the target population.

### **Poverty alleviation**

Savings described in the previous section might lead to poverty alleviation when happening to the poorest households.

## **1.6.4 Collaboration**

### **Cooking**

#### **Sector alignment**

The programme proposed is in line with DRC's National Electrification Programme and contributes to the country's commitment to low carbon growth through the promotion of improved cooking technologies and the limitation of deforestation (DRC has ratified the Paris Agreement and is committed to 17% Emission Reduction below Business as Usual by 2030). DRC has no specific policy on clean cooking sector, and simply mentions within the targets of its National Agenda "access for all men and women to electricity and clean cooking". This intervention is also aligned to the REDD+ national policy ("*Programme de substitution énergétique au bois énergie*") and to the referring "Plan d'Investissement REDD+" for 2016-2020.

#### **Implementer base**

UNDP/UNCDF is planning a market-based intervention of ICSs promotion within the framework of REDD+ policy in specific urban and suburban areas (Kinshasa, Lubumbashi, Bukavu, Goma). AVSI/EnDev has been systematically coordinating and sharing both the market assessment and the implementation activities with UNDP/UNCDF for the concerned areas of Eastern DRC (Bukavu and Goma). Regular coordination meetings are organized to strictly avoid double counting and overlapping.

In the past, WWF endorsed ICSs local production in Goma and distribution in the closest cities. Their market-based approach was complemented by a carbon credit component that is still in place although no subsidies are granted to consumers. AVSI/EnDev is regularly coordinating with WWF exploring all possible synergies. For example, by improving the quality and efficiency of the local ICS model introduced by WWF and training producers involving the trainers trained by WWF program. During the next few years, they will pilot a project concerning biogas/bio-digesters for HHs cooking purpose. Another important complementarity could be related to the promotion of sustainable fuel. WWF supported trees cultivation to produce eco-charcoal to substitute the one causing deforestation in Virunga and other forests. For the moment, this charcoal is mainly distributed in Goma.

The *Clean cooking alliance* is supporting the establishment of a laboratory to test ICSs performances and efficiency at the *Centre d'Études et de Recherches sur les Énergies Renouvelables de Kinshasa* (CEREK-ISTA). AVSI is in contact with the responsible people and attending the meetings organized by CCA on clean cooking standards and attending the DRC working group. Finally, CCA launched an invite for proposals to the Incubator Fund for Clean Cooking



in DRC last year. EnDev will align with CCA in order to avoid duplication, and double counting and gather market intelligence on players and gaps.

The *Italian Ministry of Environment* together with the local Ministry of Energy also approved a rural electrification project under realization by the same AVSI in the Idjwi Island: synergies in logistic, HRs and awareness campaigns will be explored to promote ICSs and e-cooking. The same will happen with *Equatorial Power* (private company and AVSI partner also in other countries) and its rural electrification programs/investments. The two projects foresee the installation and management of solar mini-grids in Idjwi Island and the promotion of PUE. Contacts is occurring with *Tearfund* to explore synergies and support concerning their strategies on energy humanitarian settings.

During the meeting of the “*SAFE Group – Safe Access to Fuel and Energy*” promoted by UNHCR in Goma (February 2019), it emerged clearly that no international agencies in East Congo has energy as priority within its humanitarian program nor supports the cooking sector. Although pandemic (including Covid-19) and insecurity are priority emergencies, AVSI is trying to exploit its historical collaboration with these agencies to place clean cooking in their agenda. AVSI will collaborate with any new future interventions supported by donors and multilateral organizations concerning ICSs market enablement.

Regarding advocacy and collaboration with government, over the decades AVSI has built a strong relationship with local authorities in East DRC. Their technicians and responsible people are always involved in designing strategies and implementing activities: sharing and coaching lead to knowledge transfer and advocacy concerning ICSs market promotion. The lack of HQs in Kinshasa and the distance did not allow developing solid contacts with the central ministries. AVSI’s DRC strength is the field reach and communities knowledge: it has always been one of the biggest humanitarian NGO, focused on outputs, outcomes and sustained impacts. EnDev program will allow AVSI - possibly also through GIZ delegation in the capital - to share its field experience contributing to create champions at GoDRC level to carry the ICS market development forward.

### **Leverage**

EnDev will continue contributing to the establishment of more favourable conditions for new producers and distributors investing in ICSs business. EnDev contribution will be realized by supporting existing and new producers and distributors in providing a quality local ICSs and higher tiers ICSs offer, through wider distribution channels, effective models and instruments of awareness creation, behavioural change initiatives, and marketing leverage management, but also by disseminating market intelligence and valuable proof of concept. Moreover, through awareness raising and behaviour change campaigns, consumers will be driven to demand higher tier ICSs or modern and cleaner cooking solutions that will also be piloted.

### **Nexuses**

The program will try to create synergies with existing AVSI projects (VSLAs promotion, cash transfer for refugees, nutrition, education, rural electrification, vulnerable children and HHs Distance support program - DSP) that can be explored both as awareness raising tools and as potential sales channel. AVSI staff from other sectors (specific projects in humanitarian settings last 12 months in average) will be trained on ICS benefits and basic behaviour change communication skills by EnDev project staff. Other nexuses could be identified and exploited based on the Consumer behaviour assessment.

## Productive use of energy

### Sector alignment

The programme proposed is in line with the national Electrification Programme and contributes to DRC commitment to low carbon growth by promoting access to renewable energies (DRC has ratified the Paris Agreement in December 2017 and is committed to 17% Emission Reduction below Business As Usual (BAU) by 2030).

In 2014, the GoDRC approved and the President signed a new Electricity Law in an effort to make the power sector an effective driver of economic growth, increase electricity access, and attract private sector investments. Among others, the law removes SNEL's monopoly status, promotes public-private partnerships, delegates some authority to provincial governments and calls for the creation of an electricity regulatory agency (*Autorité de Régulation de l'Électricité*, ARE) and a rural and peri-urban electrification agency (*Agence Nationale des Services Énergétiques en milieu Rural*, ANSER). Both Agencies ARE and ANSER were only recently established (August 2020).

The Government of DRC developed the National Strategic Development Plan which has a section focusing on electricity and the Unit for Management and Coordination of the Ministry's Projects has been operating since 2015 to support a range of on grid and off grid energy projects in DRC coordinating with SNEL, for the on grid ones, since 2017 regarding the rehabilitation of existing grid infrastructure and extension of electricity lines. In July 2018, DRC's renewable energy companies established a national association called the Congolese Association for Renewable and Decentralized Energy (ACERD) that coordinates energy companies in DRC to respond to energy access problems and to create a conducive environment for the development of the renewable energy private sector; the association has gained membership into the Global Off-Grid Lighting Association (GOGLA). ANSER in close collaboration with ACERD has recently prepared and shared an initial concept note for the creation of the national MWINDA Fund that intends to provide grants for different technologies, including for clean cooking. Design still being developed.

According to a recent analysis by PowerAfrica, DRC has lifted import duties and valued-added taxes for generation equipment, including renewable generation, but it is unclear whether or not these waivers include solar generation and the waivers are not yet being implemented in practice.

The proposed intervention is in alignment with the national strategies though the national context does not provide a developed enabling environment for a market for energy access technologies.

### Implementer base

The PUE component will be implemented in close partnership with mini-grid developers already established in Idjwi island and potential new ones and with the national and local authorities. 1 mini-grid was already established by the company Equatorial Power in Bugarula, 1 will be established in Kimomo and Kashara by July 2021 by AVSI through an existing program funded by the Italian ministry of Environment through the DRC Ministry of Environment to AVSI and that will become property of Bukavu Province. In such government program AVSI is collaborating with the DRC Ministry of Environment and the one of Energy and with their representatives at the Province level and plan to continue such partnership under the present

project. The island of Idjwi has been chosen as target of this proposal together with the authorities for the reasons expressed in Chapter 2 - ToC.

The company Equatorial Power is at the moment the only present in the island and plans to establish two additional hybrid PV solar mini-grids and an industrial park focussed on providing products and agro-processing services for local value chains on Idjwi island. The company is in the process of obtaining the needed licences. The first mini-grid will power an existing agro-processing hub run by Prolasa<sup>32</sup> (local NGO), the second grid will be established in another location of the island and will provide electricity for about 350 connections and power a second agro-processing hub. The services offered by this second hub (probably cold chain and processing for horticulture products + purified water). Both facilities will be powered through containerized plug-and-play solutions. AVSI will work in close collaboration with *Equatorial Power* in order to promote access to equipment to local individual and group of entrepreneurs and will deploy a business incubation programme to empower local entrepreneurs through key business skills and productive asset financing, centred around women empowerment. The mini-grids developer decision for investment is independent from AVSI PUE intervention, but the realization of such intervention is expected to strengthen the business case for mini grids deployment.

AVSI will also promote PUE in Kimomo and Kashara and around any additional mini-grid that will be established by any other developers or by the province of Bukavu itself through additional support by the Italian Ministry of Environment. the existing mini-grids in Bugarula (already built by Equatorial Power) and the one in Kimomo and Kashara that AVSI is implementing under another program.

In case the new mini-grids will not be established AVSI will promote an higher mix of standalone solutions that will be provided by suppliers present in Goma and Bukavu (specific names have not yet been identified).

AVSI will also collaborate with the companies in ACERD to attract suppliers of energy products in Idjwi and will seek partnerships/synergies with the energy programs being promoted by the World Bank and Power Africa through identification of reliable suppliers of standalone systems and mini-grid developers and leverage on the support provided by the 2 programs to value chain operators.

### **Leverage**

The project aims at showing the business case for the sale of quality and efficient energy access products and services, and for business credit in the energy sector to equipment suppliers and to financial organizations (micro-credit institutions and informal credit organizations). By doing so, the ambition of the intervention is to increase the attractiveness of the energy sector in Idjwi and beyond and to leverage extra investment and expansion in the sector by equipment providers and financial institutions. This will be done also through the establishment of a matching grant scheme that will make it easier for the beneficiaries to access productive use equipment and for the suppliers to sell them.

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<sup>32</sup> The hub is not powered because it was designed together with a power generation plant that PROLASA eventually did not have the funds to establish, therefore Equatorial Power has entered into an agreement with the local NGO to build the power generation system and sell the electricity to the industrial park.

Despite the mini-grids developer decision to invest in Idjwi is independent from AVSI PUE intervention, the realization of such intervention might strengthen the business case for off grids-mini grids and therefore attract more investors.

AVSI will also utilize the results of the program to leverage funds from other interested parties and donors to scale up the intervention.

### **Nexuses**

The main interconnections of the project are with skills development, access to finance and agriculture value addition. The program will promote business development locally through the provision of business skills. Moreover, access to finance will be facilitated thanks to the empowerment and the capacity building of local financial institutions. Finally, the use of energy will be channelled mainly in agriculture value addition productive uses therefore having an impact on the agriculture/agribusiness development of the area of intervention.

## **1.6.5 Modalities**

### **Cooking**

#### **Approach**

EnDev will focus on one priority sector (locally produced ICSs for charcoal and firewood) and well-targeted areas: urban and suburban areas of Kalemie (Tanganyika province), Bunia (Ituri) and urban and rural areas in Idjwi Island (South-Kivu). Further details on the target groups (no. of HH, member per household, average income) are provided in Chapter 1 (Theory of Change). The idea is to set up a market driven project infrastructure and demonstrate the potential and viability of its support in view of a future upscale also toward higher tiers ICSs and clean cooking solutions. The initial activities will try to tackle first market entry / development barriers: market information, technological (production equipment and material), technical (ICSs quality standard), managerial and financial (access to credit) gaps, on the supplier side; ICSs awareness, acceptability (especially in Idjwi Island among Pygmies) and affordability gaps on the demand side. Synergies are being created with UNCDF (market information sharing and complementary targeted location to strictly avoid overlap and double counting) and WWF (market intelligence sharing, more sustainable fuel promotion, technical/technological skills sharing). Local authorities are always involved in field activities conception and implementation leading to their increased capacitation on ICS market promotion. During the second part of the programming period, the pilot distribution of higher tier ICSs and the market test of e-cooking solutions could create conditions for upgrading EnDev intervention in the area.

The tentative list of technologies EnDev is/will be promoting in Eastern DRC (for the reasons explained in Chapter 2) includes:

- *Jiko Nguvu* charcoal stove, locally produced (ceramic liner + metal jacket, min. 30% fuel savings compared to the baseline, i.e. traditional charcoal cook stoves). It has been distributed in the suburban areas of Kalemie and Bunia, but also in northern part of Idjwi Island. It was selected because it was by far the most efficient and disseminated (also copied, i.e. fake ICSs) local charcoal ICS.
- *Canarumwe* firewood stove locally produced (full ceramic, 40% fuel savings compared to the baseline, i.e. 3-stone-fire). It will be distributed in Idjwi Island. It was selected (among few successful models promoted by EnDev in other similar African contexts)

through a participatory approach that involved producers (especially Pygmies) and consumers.

- *Jikokoa* charcoal stove from Burn (industrialized stove, ISO/IWA Tier 4 for PM2.5 and thermal efficiency, at least 50% fuel savings compared to the baseline, i.e. traditional charcoal cook stoves) or similar. It will be imported and distributed in Goma and Bunia or other cities of the area. It is already present in Goma although with a very low penetration due to its cost. It is very appreciated by consumers.
- Electric pressure cookers to be selected for market test in Goma and/or Idjwi Island and/or other locations where AVSI and partners are implementing rural electrification projects (solar mini-grid).

## Activities

Based on the approach described above, the following key activities will be implemented:

### Market intelligence

- Dissemination of the findings of the comprehensive market assessments studies for ICSs realized in the targeted areas in 2020.
- Following different meetings to align contents and methods (questionnaires, sampling, indicators), AVSI realized the study in Kalemie, Bunia and Idjwi Island and UNCDF in Goma and Bukavu. The two studies will be disseminated (hard and soft copies distribution, workshop) among producers, distributors, local authorities and international agencies to create a more informed environment toward more effective promotional activities, new investments and project design in the sector.
- Consumer behaviour assessment.
- The study will (i) investigate the ultimate barriers and drivers (enables) toward the adoption of Jiko Nguvu and Canarumwe stoves by HHs (including a special focus on HHs access to credit); (ii) suggest strategies and instruments to address the barriers and to exploit drivers within a behavioural change campaign and identifying possible nexuses with other sectors (e.g. health programs by GoDRC and international agencies); (iii) highlight gender aspects and modalities to be integrated into the awareness raising and behaviour change initiatives.
- Market assessment and pre-feasibility study for higher tier ICSs and e-cooking.
- The study will include following aspects: existing models (e.g. higher tier ICSs charcoal/firewood and e-cooking), players and programs; existing financial tools and gaps; gender and energy relationship; elaboration of sustainable business models proposals and marketing strategies for higher tier ICSs pilot distribution and e-cooking market test.

### Support to producers / supply side

- **Provide existing (6) and new (at least 6) local ICSs producers with adequate technology and skills to profitably manage quality local ICSs production.**

This activity will be implemented according with EnDev BDS principles and will include:

- Result based support for local ICSs models production equipment (e.g. mould, rolling and shaping machineries, and other work tools) and materials (e.g. zinc sheets for shelter's roof) for facilities improvement. Considering the limited budget available, very simple performance base schemes will be tailored on each producer assigning specific targets in terms of units sold and/or ICS quality and/or productivity.

- TA (consultant) for training on local ICSs (*Jiko Nguvu* and *Canarumwe* stoves) quality production (at least 60 people will be trained, of which at least 20% women), production process standardization, re-organization and costs saving interventions.
  - Practical basic business management training and coaching (including business plan elaboration and monitoring) through consultants and AVSI staff. At least 36 people will be trained, of which at least 20% women.
  - Support for business formalisation and fiscal compliances (TA from consultant and coaching by staff)
  - ICSs transport to the market and visibility through the 3-wheel motorbikes that will be branded *Jiko Nguvu* and will be initially managed by AVSI staff (at least one per targeted location).
  - Specific supports will be granted to increase women engagement in the whole value chain (e.g. addressing mobility and childcare during training, giving priority to women-led enterprises or to the enterprises that employ the highest percentage of women, in case of start-up support to new *Jiko Nguvu* and *Canarumwe* stoves producers).
- **Provide existing and new local ICSs producers/distributors with marketing tools and skills to improve their distribution capacity.**  
At least 12 producers and 28 distributors (*points of sale, wholesaler, retailers*) will benefit from this activity that includes:
    - The prospection of new sales channels (TA by AVSI marketing coordinator for cooking sector);
    - TA to improve distribution/sales organization, advertising, promotion, sales and marketing techniques (Training by a consultant, coaching by Marketing coordinator for at least 110 people of which at least 40% women). Considering that in AVSI experience women has always produced better results in terms of sales and ICSs promotion, the project will make every possible effort to support women involvement in this component.
    - Labelling and brand identify for *Jiko Nguvu* quality stoves (Marketing kits)
  - **Pilot higher tier imported ICSs distribution and realize a market test for e-cooking.**  
This activity includes:
    - Supports for the elaboration and pilot implementation of a business model for the distribution of one imported ICSs model (e.g. the *Jikokoa* stove) informed by the above-mentioned market assessments. Supports will consist in consultancy for import procedures, technical training on technologies, marketing instruments, promotional initiatives, monitoring and business coaching for at least 3 distributors (10 people trained/supported, min. 4 woman)
    - Supports for the elaboration and market test of a business model for the distribution of one e-cooking device (e.g. electric pressure cookers to be selected) informed by the above-mentioned market assessments. Supports will consist in consultancy for device selection and, in case, import procedures; technical training on technologies, marketing and financial instruments, promotional initiatives and business coaching for at least 1 distributor (4 people trained/supported, min. 1 woman). At least half of the 100 HHs that will be supported (credit + guarantee) to buy an e-cooking device will

be constantly monitored to evaluate the technology acceptance, performances, savings

#### Support to demand side

- **Awareness raising and behaviour change campaigns to increase HHs adoption and sustained use of local ICSs.**

This activity will be shaped by the results of the consumer behaviour assessment and will include communities' mobilization, events in schools, awareness raising meetings at community level; demonstrations; radio campaigns; road shows (theatre, music, and dance); training of other projects/partners staff; and door-to-door ICSs promotion; dissemination of *Jiko Nguvu* and *Canarumwe* stoves instructions brochure to promote their safe, efficient and sustained use. ICSs producers and distributors will be involved in the conception and implementation of the campaigns that, in particular, will have to enable HHs perception on ICSs convenience. As gender plays a significant role in the adoption of ICSs, gender specific interventions should target both women and men and, when possible, facilitate an increased participation by women in the decision-making process.

- **Awareness raising and behaviour change campaigns targeting higher tiers ICSs promotion.**

This activity will be informed by the results of the market assessment and pre-feasibility study for higher tier ICSs and will target specific communities (HHs) in Goma and/or Bunia or other cities of the area.

- **Affordability's support for local ICSs.**

This activity is based on the exploration of potential synergies and collaboration with other projects and initiatives (cash for transfer, VSLAs, environment protection, carbon finance, humanitarian aid) to increase ICSs affordability for the most vulnerable HHs including refugees. VSLAs will be reached by AVSI field officers for informative sessions about ICSs benefits and traditional cooking risks especially targeting women participation. Field officers will also stimulate the cooperation (discounts, guarantees, etc.) between VSLAs and the local ICSs producer/distributor. Finally, EnDev will facilitate cooperation between humanitarian agencies and local producers to provide refugees with subsidized ICSs.

- **Affordability's support for higher tier imported ICSs.**

Apart from the previous initiatives, due to the higher cost of these stoves (€40/50 depending on transport and custom clearance costs) affordability will also be promoted by facilitating partnerships between distributors and microfinance institutions (MFI). EnDev will eventually cover financial risks by a guarantee.

#### Advocacy and enabling environment.

- **Collaborations with GoDRC, UNCDF and other players**

The absence of clear national targets for clean cooking, and the lack of a specific policy framework or standards will be possibly tackled together with other agencies depending on the government availability. EnDev-AVSI will try to contribute by sharing its experience on ICSs value chain strengthening, behavioural change campaigns and its field (rural HHs and communities) knowledge. At this stage, considering the limited budget and the



lack of specific internal skills, EnDev (AVSI DRC) cannot technically contribute to clean cooking performance tests and standard definition. EnDev will continue to sharing market intelligence, results and lessons learned with UNCDF, collaborating with humanitarian players to promote ICSs access to the most vulnerable HHs and with MFI to establish and accessible and viable financial framework to sustain higher tiers ICSs distribution.

### **Reasons for Approach**

Considering the vulnerabilities of East Congo area, the allocated budget, the still nascent ICSs market, but also considering the potential represented by urban agglomerations and by the number of fake ICSs producers, EnDev decided to build on the current interventions informed and upgraded by the lessons learnt and the studies realized in 2020 (please refer to Chapter 2 for findings and reason why of the identified strategies/activities).

At this initial stage, it seems not realistic to waste efforts and resources on the market of higher tier stoves. In fact, during the first two years (2021-2022), EnDev will exclusively devote itself to promote a sustainable market for local ICSs. During the second part of the programming period (2023-2024), while confirming the priority focus on local ICSs, it seems appropriate to spend few efforts to lay the foundation for a future upgrade of EnDev engagement in DRC cooking sector (transitional approach).

### **Effectiveness and Cost-efficiency**

In the context of DRC, with all its challenges, and the fact that EnDev is new in DRC, cost-efficiency may not necessarily be a first priority for the program design. Start-up new producers, increase ICSs production capacity, expand HHs awareness, establishing trustful relations with GoDRC, identifying champions, improving the enabling environment, scouting for complementarities with other DPs will require additional resources, before the private sector can actually flourish under proposed interventions.

In any case, when possible, the project will target existing stove producers to support their upgrade toward the production of *Jiko Nguvu* or *Canarumwe* stoves leading to significant economies in terms of technical training and equipment costs. The performance-based approach entails that the support (technical assistance, production and marketing material and equipment) will go primarily to the most performing local ICSs producers/distributors. Furthermore, they will be supported gradually and only if their business plans are judged realistic and promising by EnDev-AVSI business experts and if they have already concretely demonstrated commitment, adequate business and technical capabilities.

## **Productive use of energy**

### **Approach**

AVSI' proposed intervention is aimed at complementing and exploiting the opportunities brought by the availability of electricity in at least 2 new villages and in 2 existing ones in Idjwi Island and to promote productive use of energy both through access to mini-grids' generated power or through stand-alone systems.

The project approach is to work on the demand side by empowering local entrepreneurs (existing or new ones, individuals or groups) and farmers to start or expand a business activity that uses electricity and therefore to increase their demand for quality and efficient electric appliances and equipment thanks also to improved access to finance through financial organizations. On the supply side the project will work with equipment suppliers and with financial

organizations to adapt and increase their offer of energy finance and products supply to the rural communities in Idjwi by showing them the business case. This will be done through capacity building and the facilitation of B2B agreements among them and with the mini-grid developer/s. A matching grant scheme will also be developed to partially subsidize the entrepreneurs to access expensive equipment in case access to finance from financial organizations does not materialize for all the beneficiaries. The scheme design will depend on i) the availability of other financial service providers and their accessibility, ii) the type of businesses identified and iii) the contributing capacity of the entrepreneurs (the proposed functioning of the scheme is explained in annex 1).

From a market analysis conducted in Idjwi AVSI has registered a wide demand of electricity and of PUE utilization, the exploitation of which being obstructed by the unavailability of electricity and by the low investment capacity and access to finance that the present approach is addressing.

Assessment conducted by AVSI in Goma and Bukavu (the main markets for appliances accessible from Idjwi) show that there are multiple providers of energy efficient productive appliances of the types most frequently demanded by the new/existing entrepreneurs and farmers i.e. milling and grinding machines, coolers, welding machines, carpentry equipment, etc. No challenges are foreseen on the side of the availability of such kind of appliances and interest from distributors and/or manufacturers to start/increase their offer to Idjwi, which is seen as an expansion market (as the provision of electricity increases) by most of the interviewed suppliers.

The availability of suppliers of stand-alone productive use appliances is extremely more limited, however based on the recent Off-Grid Solar Market Assessments on Rwanda and DRC there are potential distributors interested in starting distribution of these products in DRC while some existing distributors in Rwanda could be attracted to expand to Idjwi (the island is bordering the 2 countries and is accessible from both).

In the implementation of said approach AVSI will promote the cooperation with local institutions, and authorities with the objective of building local capacities and enabling a transfer of knowledge to local partners.

AVSI will implement the above mentioned approach through a dedicated local coordinator for PUE activities, a field Officer, the Senior technical advisor for PUE (all AVSI staff) and with the support of 2 consultant on Energy financial products and on agricultural value addition for PUE.

## **Activities**

Based on the approach described above, the following key activities will be implemented:

- Assess existing and potential productive businesses opportunities in the targeted villages. AVSI will conduct an assessment in selected villages aimed at gathering information on the currently existing local business opportunities within the existing value chains, focusing on MSME, Agriculture and Water for production. Business opportunities will be selected among those that can have an higher social impact and be gender inclusive (i.e.

can be run by/employ women and/or produce products or services that benefit women). This activity will be conducted with the support of value addition expert consultant.

- Select at least 80 beneficiaries (individuals or groups entrepreneurs and farmers). In order to select the beneficiaries a sensitization campaign will be conducted to invite potential beneficiaries to present their energy utilizing business in a proposed format. A committee composed of AVSI, GIZ, the mini-grid developer (if available) and a local authority will select the final beneficiaries based on the feasibility and viability of the business proposed and if rhyming with the opportunities identified in the previous activity; on the capacity of the beneficiary to contribute to the cost of the needed appliances and to run the business; on the business social inclusiveness/impact; on the demand for energy (this criteria is valid only for the case where productive use is promoted in partnership with mini-grid developers).
- Train at least 80 individuals or groups entrepreneurs (new or existing) and farmers in business and financial skills. AVSI will aim at engaging at least 50% of women in the training.
- Provide specialized coaching to the trained entrepreneurs. This activity will be conducted with the support of value addition expert consultant.
- Develop a matching grant scheme to support purchase of electric appliances and equipment and provide partial grants to the trained entrepreneurs. Through the scheme, AVSI will support the purchase of appliances for those beneficiaries that don't have sufficient own means and that don't qualify for loans, and will directly contribute to the cost of the appliances by paying the suppliers. The % of contribution will depend on the cost of the appliance and will range between from 50% to 70%.
- Assess and profile existing financial services and financial opportunities. This activity will especially focus on the barriers that prevent the financial organizations to provide financial products in the energy sector with an attention to the barriers for women and will be conducted with the support of an energy financial products expert consultant.
- Build the capacity of financial service providers to offer financial services in the Energy value chain to the project beneficiaries
- Identify energy efficient equipment and machinery providers and suppliers interested in offering their products to Idjwi
- Facilitate B2B agreements between providers and local suppliers
- Run fairs with products suppliers and financial organizations to present their products and services in the targeted villages.
- Based on the results of the above activities AVSI will systematize and document the lessons learned in a report to be shared with relevant stakeholders in the off-grid value chain through individual presentations and workshops. The document will comprise recommendation for mini-grid developers, energy authorities, and financial institutions showing the business case of investing in demand generation through PUE and of developing financial products for it. The results will be actively shared with the DP group on energy and Go-DRC champion, ASER and UCM.

## Reasons for Approach

The suggested approach is chosen based on the experience developed by AVSI in other countries (e.g. in Rwanda and Uganda within EnDev project) and, in part where the main barriers on the demand side to engage in productive use of energy are lack of business skills and financial literacy, scarce availability of own finance to acquire productive equipment and lack

of quality appliances. The nascent and complex off-grid market and the difficulties to promote productive uses of energy observed even in more developed contexts requires conducive and complementary instruments and capacity building activities to ensure increased adoption of productive use.

### Effectiveness and Cost-efficiency

In the present intervention, AVSI proposes to promote access to finance through a mix of grant provisions and access to financial markets. This mix is proposed because based on the experience in DRC and in other countries, access to finance is an important barrier to acquire energy equipment and since most likely not all the beneficiaries will be able to access to loans from financial institutions they will need to be supported with partial grants. The grant component will be higher for the most expensive equipment and lower for the cheaper ones.

## 1.6.6 Results

### Cooking

Project results	Absolute targets (2010-2024)	Additional targets (2021-2024)	Further relevant impacts/outcomes
People: Access to Cooking (adjusted numbers)	98.812	98.812	<ul style="list-style-type: none"> <li>● +12 MSMEs engaged in local ICSs production</li> <li>● 20% HHs use an ICS in the 3 targeted locations</li> <li>● +20%M, +50%W enrolled in ICSs value chain</li> </ul>

Considering all parameters and reduction factors requested by the EnDev Outcome Calculation Sheet (OCS), the present proposal will provide access to cleaner cooking solutions to 98.812 people for the whole programming period and considering all the four cooking technologies distributed. Please refer to programming OCS for all the details of this calculation and to Chapter 5 for the main outputs.

Remarks: the figures above also include the results (in term of people) from the 240 units of Jiko Nguvu stoves sold in December 2020 (when the EnDev promoted production has started due to Covid-19 delays) and still not accounted in the OCS system. In 2019 EnDev was still not operating in DRC.

### Other expected outcomes and impacts

- Contribution to increase HHs purchase power thanks to the savings (money and time that could be dedicated to income generating activities) granted by ICSs adoption
- Improved health (women, children) thanks to the reduced harmful emissions for families that newly adopted an ICS as main cooking technology.
- Improved gender equality thanks to women enrolment into the ICS value chain and increased role in HH decision making process toward the adoption of an ICS.
- Increase sustainable consumption thanks to awareness raising activities, especially concerning cooking fuels (reduced by the adoption of an ICS)
- Increased MSEs productivity and profitability through all the interventions foresaw to strengthen the ICSs value chain.
- Increased job creation, technical and business skills

### Preliminary list of indicators

Impact/ Outcome	Indicator	Initial value	Final value	Source of verification
1	Money spent on charcoal/firewood by HHs in the 3 targeted locations	Baseline value	At least -20%	Baseline/ End-line survey
2	(proxy) % of HHs that use an ICS in the 3 targeted locations (linked with emissions reduction per ICS model as per laboratory test results)	(<5%) Baseline value	At least 20%	OCS
4	% of people that know at least 2 ICSs benefits in the BCC targeted areas	Baseline value	M: +20 points W: +30 points %	Baseline/ End-line survey
5	No. of producers that produce over 100 local ICS models per month in the three targeted locations	3	At least 6	Baseline/ End-line survey
6	No. of active local ICSs models producers in the 3 targeted locations	6	At least 12	Baseline/ End-line survey
3, 6	No. of new people enrolled in the ICS value chain in the 3 targeted locations	Baseline value	M: +20% W: +50%	Baseline/ End-line survey

In the inception phase and before the realization of the baseline study AVSI-DRC will operationalize the above-mentioned additional results and develop the most appropriate measurable indicators for monitoring also considering the one identified by the new EnDev logical framework.

Evaluations (Baseline and End-line) surveys will be executed by an external (independent) consultant that will also measure the indicator values.

### Main assumptions for the results achievement

- HHs and businesses buy or invest in cleaner cooking solutions
- No pandemic major outbreak (incl. Covid-19), no major political, financial or institutional instability or security problems
- Supportive or neutral attitude by government and local authorities vis-à-vis the ICSs market and NGOs operations
- ICSs producers and distributors respect all fiscal, legal and human rights frameworks
- Government and agencies (e.g. UNDP/UNCDF) allow AVSI to provide contribution in term of enabling environment and advocacy and recognize in full its role of EnDev project implementer in DRC.

### Productive use of energy

Project results	Absolute targets (2010-2024)	Additional targets (2021-2024)	Further relevant impacts/outcomes
PU: Access to Electricity (adjusted numbers)	51	51	<ul style="list-style-type: none"> <li>• 80 individuals or groups of entrepreneurs/farmers provided with business and financial skills (50%W)</li> </ul>

The intervention is expected to have impacts beyond the 80 (not adjusted numbers) MSMEs that will be supported to start businesses that utilize electricity productively. At least 80 new or existing entrepreneurs (of which 50% women) will be provided with business and financial skills resulting in at least 51 new businesses mostly active in the provision of agriculture value addition services and products not available before or available at higher energy costs and therefore prices. The whole intervention is therefore expected to lead to an increased access and affordability of agriculture value addition (processing) for household crops.

## 1.6.7 Sustainability

### Cooking

### **Financial sustainability**

Building on EnDev DRC current market driven approach, the project will focus on developing and supporting assets and skills of the existing or new profit-oriented producers and distributors. While targeting their increased sales and profits, EnDev will therefore strengthen the local ICSs business cases. Every player (at least 12 producers and 28 distributors) will be supported (coaching by the Marketing coordinator, supervised by the Project coordinator and with the support of the ICSs expert) for the elaboration and monitoring of a specific business plan toward the achievement of their break-even point (if still not reached) and profitability. The promoted viable business cases and the promoted improvements among providers (financial, managerial and marketing skills) and consumers (demand activation) will persist and generate their effects beyond the end of the programme.

### **Institutional sustainability**

The whole intervention will directly or indirectly strengthen the knowledge of all stakeholders involved in the ICSs value chain (producers, point of sales, consumers/households, international organizations, local NGOs and authorities) concerning a market approach meant to remain. For example, local authorities will be permanently involved in activities implementation (in particular for behaviour change and awareness raising campaigns) at least in terms of permission requests, facilitation and – when possible – even conception, as it is normally the case with all AVSI projects. This facts normally entail local authorities' capacitation and lead them to the autonomous management of ICS-linked initiatives.

Considering the fact that AVSI is perceived as an NGO and not as an international cooperation agency and that AVSI does not has an HQs in Kinshasa, EnDev project managers will try identify and work with a champion at Government level to share lessons learnt from the field, impactful strategies and instruments for the strengthening of the clean cooking sector in DRC. GIZ delegation in Kinshasa may possibly facilitate EnDev's advocacy with the GoDRC (AVSI introduction to GIZ-DRC is still to be performed).

### **Ecological sustainability**

The project will only promote cooking solutions that will save or replace cooking fuel (charcoal and firewood), reduce GHGs emissions and limit deforestation. Please, refer to Chapter 5 list for detailed list, basic specifications and performances of the promoted cooking solutions.

### **Technological sustainability**

All technological contents (excluding e-cooking) were identified according to the ICSs market assessment performed in 2020, and will be at the reach of producers, clients, and other stakeholders. Please refer to Chapter 5 for additional details on consumer acceptability and ICSs selection methods. In any case, the projected marketing initiatives and the behaviour change and awareness raising campaigns that will target consumers/HHs of the three locations, will include use and maintenance trainings and instructions brochures in order to promote a safe, sustained and efficient use of these cooking devices. For the e-cooking market test, an adequate training will be offered to the selected HHs and distributor/s.

### **Social sustainability**

No project's outcomes risk to lead to social tension and or be socially unacceptable because of the market driven and consumer centred approach and the behaviour change promotion will



only succeed with the total consent of communities/consumers and if in line with local culture and habits. Local authorities and traditional leaders will be always involved in community activities. A special focus will be paid to promote women engagement in the ICS value chain.

### **Exit & handover strategy**

Within the framework of EnDev market-driven approach, the strengthened *Jiko Nguvu* and *Canarumwe* ICSs producers and distributors will constitute the pillars of the handover strategy. These players will be the natural beneficiaries and tributaries of the programme outcomes that shall remain beyond the project granting their autonomy in managing a sustainable ICSs business. From its inception, the project will be implementing all the activities through existing or new producers and distributors (private MSMEs) and will aim at the creation of a sustainable market. Moreover, the value proposition of the two local ICSs, promotions, and awareness raising campaigns will be informed by a consumer centred approach targeting its increased awareness about ICSs benefits and its permanent behaviour change toward cleaner cooking solutions. This last fact could also contribute to create a stable substitution market with no support needed.

### **Productive use of energy**

#### **Financial sustainability**

Due to the overall low capacity to pay of the Congolese population, it is highly likely that financial support will be required in the long-term to ensure sustainable productive use of energy. Where AVSI will partner with the mini-grid developer Equatorial Power, financial sustainability after the end of the project might be higher in case the developer will be willing to provide partial access to finance or payment solutions for acquiring productive equipment, which might substitute the matching grant approach utilized in the proposed intervention in the sites where additional mini-grids will be established (additional to the 2 new ones foreseen within the life of the present project). Where partnering with stand-alone system providers the financial sustainability will be dependent on the access to subsidy schemes.

#### **Institutional sustainability**

In the implementation of the PUE component AVSI will promote the cooperation with local institutions, and authorities with the objective of building local capacities and enabling a transfer of knowledge to local partners. Specifically, AVSI will work in cooperation with Bukavu Province with the Energy and Environment offices whose capacity has already been strengthened through previous collaborations. The authorities will be invited to monitor the intervention, build relationships with financial organizations and suppliers and to continue support to develop the market for energy access technologies.

#### **Ecological sustainability**

AVSI will partner with suppliers that can guarantee long life products, and possibly an E-waste plan. Moreover, in the case of the mini-grid developer, AVSI will collaborate with mini-grid developers that have obtained an approved environmental impact assessment approved by the province (the assessment are a law requirement for the developers to operate).

#### **Technological sustainability**



All technological contents of the programme will be well within the reach of clients, and other stakeholders. Moreover, only producers/suppliers of high quality and certified SE products (respecting EnDev and Lighting Global Quality Standards) will be selected as partners of the program.

### **Social sustainability**

To avoid social tensions or inequalities AVSI will: facilitate the interaction between the companies and the communities in order to manage expectations and avoid exploitation risks; engage community leaders, local authorities and the private sector partners in the selection of beneficiaries using shared and transparent criteria; support and promote productive activities in the most impactful sectors, like agriculture value addition, in order to make essential services and products available to the communities therefore benefitting a big part of the local population.

### **Exit & handover strategy**

Exit strategy: AVSI will work with the mini-grid developers to facilitate their agreement with the financial organizations and the PUE appliances' suppliers that will be engaged in the project. The intention is to favour the developers' involvement in facilitating the access to appliances by their clients who will as a consequence increase their demand for energy and knowledge and capacity to access finance.

Synergies will moreover be sought with new projects that AVSI will design in the same geographical and sector area, and with other upcoming interventions led by AVSI or other development partners in order to allow where possible the continuation and or/scale up of the intervention.

## **1.6.8 Gender Strategy and Safeguards**

*See in attachment the Gender Analysis for DRC.*

The Gender analysis shows that the situation of Congolese women is still worrying: unequal treatment between women and men, multiple discrimination of women and girls, and gender-based violence extends from the private sphere to the public social space and to the institutional level in all sectors of life. Traditional Congolese society was generally governed by a system of patriarchy. In general, the authoritative role of men and the subordinate position of women is reflected in the economic life and access to energy and technologies. The project should be guided by the basic concept of considering women as the primary beneficiaries in a Congolese society in which gender discrimination is socially and culturally accepted. In both areas of intervention, ICS dissemination and PUE projects, women will be positively impacted as consumers of new cleaner cooking solutions as well as entrepreneurs. The project is aimed to untap the potential of female workforce (supply) and to improve domestic conditions of women and children most affected by inefficient cooking appliances (demand). AVSI, per its own culture and mission, embeds in its projects and daily life of the organization a transformative approach to promote personal and human development, with a special attention to gender equality in order to generate, internally and externally, a long-lasting impact in this direction. In order to face the unequal treatment that women suffer in DRC, the project's activities should create an empowering process to promote gender equality. With the support of income-generating activities such as sales of ICS and ceramic components manufacture, women could acquire a major financial autonomy and independence from men. Moreover, the project should

train and provide skills to ICS saleswomen and improved cooking promoters. In ICS related actions, women, as the main users, should be the strongest advocates to promote a positive impact through an increased awareness that positively impacts the health and the economic conditions of the household. Actually, ICS use reduced expenditures on fuel and frees up time previously spend on firewood collection and cooking that can be used for productive activities. In addition to that, in Idjwi Island, the female entrepreneurship should be supported with the creation of women led PUE businesses.

In order to guarantee the Do-No-Harm principle, the messaging of the awareness campaigns and the communications with local authorities should clearly show that the inclusion women is an added value for the community. This is crucial since at different levels of society, there is a general criticism on women's empowerment due to the opinion that it does not fit with the local culture. Men usually misunderstands the inclusion of women as a replacement of the male workforce. Furthermore, to ensure that local communities do not create resistances to the gender equality promotion, the participatory approach should also directly involve men as well as institutional and economic stakeholders.

### **Annex 1 - Financing strategy PUE Project**

AVSI will establish a matching grant fund that will be accessible to the businesses selected. In order to select the beneficiaries a sensitization campaign will be conducted to invite potential beneficiaries to present their energy utilizing business in a proposed format. A committee composed of AVSI, GIZ, the mini-grid developer (if available) and a local authority will select the final beneficiaries. Evaluation criteria may include:

- feasibility and viability of the proposed business model;
- capacity of the beneficiary to contribute to the cost of the needed appliances and to run the business;
- social inclusiveness/impact of business model;
- demand for energy (this criteria is valid only for the case where productive use is promoted in partnership with mini-grid developers).

The same committee will take decisions on the use of the fund.

The size of the matching grant offered by AVSI to selected businesses will depend on:

- the value of the appliance (FoB price)
- the beneficiary's capacity to match the grant with own funds
- the beneficiary's capacity to access a loan from one of the financial institutions

For the part that will not be covered by the grant the following options are foreseen.

*The beneficiary/group matches the grant to purchase the equipment needed and start up the business.*

AVSI will pre-select appliances and machineries' suppliers through a bid process and will then establish purchasing conditions favourable to the beneficiaries (at least 3 payments). The supplier will present an invoice to AVSI after having received a deposit of an agreed amount from the beneficiary/group on its bank account.

*The beneficiary/group cannot match the entire grant and needs to access a loan from a financial institution.*

In case the business projection shows capacity of loan repayment, after decision of the committee, AVSI will support the beneficiary/group to present its loan request to a financial institution facilitating the preparation of the documentation and the verification of all the pre-conditions requested by the bank.

AVSI will then provide coaching to the beneficiary to plan his/her loan repayment within the business cash projections.

# 1.7 Ethiopia

## 1.7.1 Summary and key data

Promoted technologies			
	<p><b>Promotion of RE solutions</b></p> <ul style="list-style-type: none"> <li>Off-grid electrification mini-grids and standalone systems</li> <li>Clean cooking solutions and clean fuels</li> </ul> <p><b>RE market expansion</b></p> <ul style="list-style-type: none"> <li>Organizing large-scale awareness campaigns, private sector capacity development, development of industry associations</li> </ul> <p><b>Enabling Environment for RE market development</b></p> <ul style="list-style-type: none"> <li>Advisory in national policy-making and sub-national governance</li> <li>National standards for the ICS and solar sectors</li> <li>Financial Systems Development in the energy sector</li> </ul> <p><b>Cooperation and synergy</b></p> <ul style="list-style-type: none"> <li>Synergetic programming with other development partners to amplify development effects and sustainable energy market development.</li> <li>Partnerships and close coordination with other development partners. EU support strategy for the Ethiopian energy sector, close coordination with the World Bank’s ADELE project, UNDP off-grid program, GOGLA and AfDB mini-grids programme</li> </ul> <p><b>Facilitating access to finance</b></p> <ul style="list-style-type: none"> <li>Leverage credit facilities of multilateral organisations such as the World Bank and the African Development Bank (AfDB) and IFC to further amplify development effects with solar and improved cookstove enterprises as well as mini-grid developers.</li> </ul>		
Summary of proposed interventions(s)			
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	1,160,869	People	higher tiers, vulnerable groups, gender, social empowerment
Cooking / thermal energy for households	635,279	People	e-cooking, higher tiers, vulnerable groups, clean indoor air, gender, environment
Electricity and/or cooking / thermal energy for social infrastructure	1,276	SI	e-cooking, higher tiers, energy justice, better social service
Energy for productive use / income generation	2,173	MSMEs	vulnerable groups, employment, gender, youth, economic development.
Project period	01.01.2021 – 31.12.2024	Indicative Budget	EUR 18.80 Million <sup>33</sup>

<sup>33</sup> EUR 10.65m (EnDev Core) and additional co-financing of EUR 3.91m (EU), 0.05m (Irish Aid) and EUR 4.19m Ethiopia share (IKEA Foundation) for 2021-2024

## **Background and introduction**

Ethiopia's rapid economic and population growth over the past years and demand for electricity have been steadily increasing. Despite Ethiopia's vast energy potential and economic growth, more than 50% of the Ethiopian people still lack access to electricity, most of them living in rural areas. In addition, 18 million households in Ethiopia use unsustainably harvested solid biomass for cooking which has adverse effects on health, local natural resource degradation, climate change, and gender. To curb this situation, Ethiopia's Climate-Resilient Green Economy (CRGE) strategy aims to reach 17.7 million households with clean and improved cook stoves by 2030, with a potential GHG emission reduction of 51.2 MtCO<sub>2e</sub>. However, given the current growth rate in the clean cooking sector in Ethiopia, it becomes clear that the CRGE target will not be reached unless broader measures are put in place.

Ethiopia remains a SEforAll high-impact country both for electricity and cooking. The Ethiopian National Electrification Programme (NEP 2.0) anticipates that of the 60 million people without access to electricity, more than half of them (35 million people) will have to be reached through off-grid solutions. More than 87 million people are without access to clean cooking energy and the lack of access to energy seriously limits the country's potential for socio-economic development, in particular in rural areas.

The government of Ethiopia has placed a strong emphasis on achieving universal electrification by 2025. With abundance of renewable energy resources and the potential to generate over 60 Gigawatts of electric power from hydro, wind, solar and geothermal sources, Ethiopia has a potential to attain 100% clean energy provision.

### **Summary of proposed intervention(s) / Key data**

EnDev Ethiopia's development interventions in electrification (mainly off-grid, covering mini-grids and standalone systems) and in the clean cooking and biomass energy value chain, are well aligned with the Ethiopia government's national policies and strategies for energy, climate change, and gender.

To date, EnDev Ethiopia's work has improved energy access of more than 1,235,961 people through the dissemination of 361,465 pico-PV solutions, 10,083 Solar Home Systems, 5 micro-hydro powerplants and 353,468 improved cookstoves. In addition, 302 off-grid public institutions like health centres, schools and farmer training centers have been electrified through 461kWp of installed solar PV. This has led to 3,087 small enterprises and 1,148 social institutions gaining access to electricity and modern cooking energy services. This was achieved by providing capacity building services to 650 cookstove producers and 100 solar enterprises, organizing large-scale awareness campaigns, development of industry associations and national standards for the ICS and solar sectors, advisory in national policy-making and sub-national governance, and synergetic programming with other development partners to amplify development effects and foster a sustainable energy market development.

This way, EnDev Ethiopia has established trusted partnerships and close coordination with other development partners. For instance, EnDev is the key pillar in the EU support strategy for the energy sector as well as close coordination with the World Bank's ADELE project. The Programme leverages additional funds from non-EnDev core donors, currently in the order of EUR 13.4m (EU, Irish Aid and KOFIH). The programme is also managing a new IKEA

Foundation funded regional project on “**Sustainable Energy for Smallholder Farmers in Ethiopia, Kenya and Uganda**” that develops 1 to 2 viable business case models and cross-country learnings on productive use of solar energy in the Dairy and Horticulture value chains in the three countries.

EnDev Ethiopia has generated spinoff projects that now constitute the GIZ Ethiopia Energy portfolio. This includes, 1) the German Government funded “Green People’s Energy (GBE)”, a cooperative approach to energy access that is particularly suited to the Ethiopian rural development context, 2) the project “Energy Solutions for Displacement Settings (ESDS)”, a collaboration with UNHCR to address energy access in refugee/ humanitarian settings, and 3) the “Ethiopian-German Energy Cooperation (EGEC) project” that aims at supporting the sustainable expansion of electrification in Ethiopia based on renewables and at sharing learnings and potentials in the German energy transition including private sector networking. These projects are mainly based on and as well greatly benefit from the long standing and ongoing activities and stakeholder structures of EnDev Ethiopia. This is in addition to sharing common internal services and regional implementation structures. EnDev Ethiopia further promotes and develops its internal expertise through the programme **steering committees** and **technical cross teams** formed in the GIZ Ethiopia Energy portfolio that brings together all the projects to coordinate and synergise/ foster efforts.

In addition, EnDev Ethiopia leverages credit facilities of multilateral organisations such as the World Bank and the African Development Bank (AfDB) to further amplify development effects with solar and improved cookstove enterprises as well as mini-grid developers.

#### **Approaches for scaling (see ‘Activities’ below):**

The envisioned programme requires a budget of **EUR 18.80<sup>34</sup>million for 48 months (01/2021-12/2024)**. In combination with the ongoing co-financing, the programme will trigger attributable energy access for an additional 1,796,166 individuals<sup>35</sup>, 1,276 new social institutions, and 2,173 productive use (PU) businesses through supporting frameworks that will allow for the dissemination of 1,171,438 ICS, 1,802,113 pico-PV, 9,395 SHS systems, trigger construction of 8 mini-grids (and additional 10 mini-grids as an indirect result of supporting other development/government partners), and trigger installation of solar PV systems for 12 social institutions. Next to this, the programme will deliver against a range of enabling environment development indicators including regulatory framework improvements, improved policies and government strategies, comprehensive knowledge management system, improved collaborative partnerships among implementing agencies, and improved financial sector enabling environment that all aim to scale approaches to catalyse exponential energy market growth and lead to additional indirect results.

To implement the programme’s strategic ambition of sector transformation and accelerated energy access at scale, the programme will deliver its activities through the following components, of which one of them is the newly established “**Financial Systems Development**” component. The previous social infrastructure component has been merged with the Household Energy solar, to form a new “**Solar Electrification and Market**

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<sup>34</sup> EUR 10.65m (EnDev Core) and additional co-financing of EUR 3.91m (EU), EUR 4.19m Ethiopia share (IKEA Foundation) for 2021-2024

<sup>35</sup> Take note of the adjusted 2020 ambitious target

**Development” component.** All the components receive increased policy and gender advisory focus through dedicated policy and gender focal points that work cross cutting in all below mentioned components.

- 1) **Mini-grids component:** EnDev Ethiopia shall continue to inculcate the understanding that sustaining mini-grids is a complex undertaking that requires paying attention to multiple aspects. In addition to the right technical design, economic sustainability from increased institutional service, development of productive use of energy and right cost reflective tariffs (with coherent inclusivity and gender mainstreaming), increased human capacity, enabling legal / policy frameworks, local enforcement fostered by supportive socio-economic institutional conditions, must be factored in and closely coordinated.

Building on our proof-of-concept, this programming phase will further increase enabling environment/policy work (advising line Ministry, government agencies and regional governments) to anchor this cooperative/private sector model in policy and establish a blueprint for **replication at scale**, thereby contributing to **sector transformation**. Technology focus will expand from micro-hydro to solar and hybrid mini-grids to find the most cost-effective solution for specific sites, and see stronger **financial sector** and **private sector involvement**, through the development of a regional market that attracts competitive private mini-grid providers, and also potentially Public Private Partnerships. In addition, and as an active reference and learning ground, EnDev Ethiopia shall as well further promote productive use of energy in the existing MHP mini-grid sites.

EnDev Ethiopia shall further continue to support government agencies in the Digitalization of the off-grid sector in this programming phase as a hub for better identification of and decisions on mini-grid sites (and other areas for furthering rural electrification). The digitalization for identification of mini-grid sites will also become a cornerstone in the planned roll out of the framework for cooperative managed mini-grids as well as the implementation of NEP 2.0 and the WB-MoWIE electrification programme, ADELE. This will enable EnDev to enhance its leading role in the support of the expedited expansion of mini-grids in the off-grid areas. This digital data base shall be designed to enable different stakeholders to access valuable data and streamline their interventions.

EnDev Ethiopia shall as well further enhance its Business Development Support (BDS) to the mini-grid sector. In addition to enable an efficient public sector, to which part of the BDS shall be devoted, Ethiopia will need a strong private sector to support the Engineering (design of mini-grids), Procurement and Construction (EPC) of hundreds to thousands of mini-grids, and as competent and responsible partners for third party maintenance of mini-grids, especially in the framework of cooperative owned mini-grids.

The productive use of energy being developed on the EnDev supported sites shall be a foundation for more streamlined conceptualization and collaboration with financial institutions, the Federal Cooperative Agency, Ethiopian Energy Authority (regulator) and hardware solution providers for grain mills, welding, wood workshops etc. Introducing digital solutions and digital inclusion (such as mobile/digital payment solutions, PAYGo, etc) to guarantee quality and strong solutions for rural locations.



The up to 8 mini-grids in the new proposed programme period (2021-24) and the implementation of road map for supportive framework for cooperative managed mini-grids will serve as additional catalyst to support deeper regulatory changes, that would then allow self-propelled roll out of mini-grids through coordinated engagement of development partners, the Ethiopian government, the private sector and the community at large. It is expected that EnDev Ethiopia would achieve indirect results with 10 additional mini-grids through support to development/ government partners.

- 2) **Solar Electrification and Market Development component (former Social Infrastructure (SI) and Household Energy (HHE) solar):** The component currently facilitates market-based delivery of 60,700 pico-PV and 8,300 solar home systems annually (using 2020 figures). Furthermore, electrifying rural off-grid public institutions (health centres, schools, training centres) has proven highly successful in transforming rural setups for social service delivery.

To ensure development towards a mature market, the follow-on strategy of the component will be to consolidate efforts by focusing support on increasing larger players in the off-grid solar sector (large local companies and international PAYGO companies be it in joint venture or independently, among others). This will include making use of the projects extensive experience in building up the capacities and market-presence of local solar installation companies, to reach more rural institutions and enhancing and deepening the current focus on addressing the sustainable planning and management of these institutional PV systems.

By implementing the already identified measures through the deep dive study conducted by the FSD component of EnDev Ethiopia, market entry barriers for large PAYGO players are expected to be reduced, and larger local players will be further built up. The institutional support that is provided to the solar associations by a consortium of experienced European solar associations shall be further enhanced to build the capacities of the Ethiopian Solar Energy Development Association (ESEDA) and regional solar associations as industry voices to effectively participate in policy and strategy dialogues, enhance competition and fair play, enforce quality of products and sound business practices, as well serve as the institutional instrument for their broader membership to leverage financial and other market services such as promotional and technical capacity development support. This will also act as a platform for local and international business / market linkages thereby expediting sector growth. These measures shall be coupled through building up local capacities of both public and private actors and strengthening the role of private sector in engaging in government led solar PV electrification initiatives, mobilising finances through public and private sector innovative financial models, scaling up electrification of public institutions through seeking partnerships and leveraging available resources more efficiently to support selected high potential market actors, and achieve attributable results working with and through other partners. Our interventions will enhance greater involvement and ownership of and coordination between line ministries in the energy, health and education sectors to ensure sustainable access to energy.

In this new proposed programming phase, the component shall upgrade or modify existing systems up to 5 social institutions as models of sustainable and smart social installations introducing digital solutions for performance monitoring and status diagnosis. This shall be further integrated into the database for electrified off-grid social institutions that the

programme supported at its setup at MoWIE, contributing to the foundation of a **comprehensive digitalization** that EnDev Ethiopia is promoting in the sector.

Based on the learnings from the financial sector in Ethiopia, EnDev will pursue the RBF approach of the previous programming cycle but more targeted at the importer/wholesaler level (cf. EnDev Benin model) to engage directly with large impactful solar supply chain actors. In the proposed new programming phase, productive use of solar energy, both thermal and electricity, shall as well be fostered.

Another focus will be on institutionalizing training services in the solar sector to increase sustainability of sector support services. The project will partner with the sister programme Green People's Energy (GBE), as well as other stakeholders working in the TVET sector to develop (or, revise) a standardized curriculum, equitably covering the potential market areas in the country and with a viable cooperative training system with the solar private sector for which the solar industry associations shall play a key role. In the new programming phase, further clarification and implementation of the roadmap for a functional and accessible warranty system will be pursued to deepen the digitalization of the sector as part of the programme initiative that includes all the components of EnDev Ethiopia.

The add-on top-up component of EnDev Ethiopia from the 2019 programming/ planning phase addressing **lead acid battery recycling**, a pertinent issue regarding the environmental sustainability of off-grid energy interventions, will be continued in the new programming phase. The development and official government adoption of a **Roadmap for Used Lead Acid Battery (ULAB) Life Cycle Management** has been achieved by the component. Currently, the development of a **directive for environmentally sound production of lead-acid batteries and management** of used lead-acid batteries is being finalised. In parallel, accompanying **standard operating procedures and a licensing scheme** are being concluded. Furthermore, **take back schemes** and **extended producer responsibility** as strategies to promote sustainable environmental sound management of ULAB will be developed. As a logical offshoot of this intervention, the programme shall as well explore a framework for sound handling of other battery types and e-waste (dry cell, lithium-ion etc.).

The continued human and technical capacity development support to the public sector and the intensive technical advisory support to private sector including on access to finance towards the improvement of processes (e.g. recycling and collection) will also be further intensified.

- 3) **Cooking Energy component:** the component currently facilitates market-based delivery of 115,345 improved cookstoves annually (using 2020 figures). To ensure the development of a more enhanced, robust and transformative market, the follow-on strategy of the component will be to continue consolidating efforts and focus support on increasingly larger players in the clean cooking sector (i.e. **semi-industrial producers**) in Ethiopia. This is basically the 20% high performing ICS producers supported by EnDev who will be graduated to semi-industrial ICS producers, as well as looking for new big players/ entrants in the ICS production, thereby accelerating efforts towards **scale and sector transformation**.

In addition to working with a select group of high-impact producers, the component will continue the recently started efforts in the development of the supply chain for sustainable biomass cooking fuels (briquettes, pellets) by establishing and supporting briquetting plants in all operational regions. Depending on the region, the sources of raw materials for production of briquettes and pellets vary greatly. This include elephant grass, coffee and rice husks, khat left over stalks, specific agroforestry trees (e.g. lantana camara, parthenium, prosopis julifera), saw dust from mills and carpentry sheds and coffee grind from coffee shops. As part of the EnDev goal to “*leave no one behind*”, the component has begun and will continue the efforts to **establish briquette production plants in displacement settings** to address the severe and continuously growing energy deficit within the refugee camps and the host communities. The component aims to enhance the access to sustainable, reliable and clean cooking energy in these displacement settings using a market-based approach. The component will also provide additional support to create/raise awareness and foster positive behavioural change among refugees and the host communities on benefits of improved cooking technologies to increase demand for briquettes and appropriate ICS. These activities will be implemented in collaboration with our sister project ESDS as well as with UNHCR, ARRA and other relevant stakeholders.

EnDev Ethiopia is also exploring the **e-cooking potential** in Ethiopia, including support measures for targeted areas. Recent studies show an increasing interest in and capacity to access and utilize e-cooking options. In the last decade, electricity has become the second most important cooking fuel in urban areas in Ethiopia, coming second only to wood that is used by 21% of the urban population or 1 million households in 2016. For large cities and regional state capitals, electricity has become the most widely used source of energy for cooking (for Addis Ababa the proportion of households cooking with electricity was 63%, or 0.52 million households in 2016). According to this 2016 World Bank survey, for households in Addis Ababa it was found that 50% of the electricity consumed was for cooking and baking (35% for cooking, 15% for baking). Since the residential sector accounts for 35% of total electricity consumed on the grid, cooking accounts for 12% of total electricity consumption on the grid (35% residential total and 35% cooking in residential consumption). With growing incomes, the relatively low cost of electricity and electric stoves, and changing housing pattern in cities (growing share of apartment housing), it is expected that demand for electricity for cooking will increase further. Although current ownership and use of electric stoves is not known, it is estimated that 1.5 million households may be using electric stoves for cooking in 2020.

The component will pursue the most feasible **e-cooking technologies** to be promoted in Ethiopia where potential demand exists, applying a **market-based strategy**. The component will aim to address identified constraints to electric cooking in Ethiopia and will evaluate the key challenges for transition from cooking with biomass to electricity as well as constraints for efficient use of electricity for households already cooking with electricity. In 2021, the component will conduct surveys of electric stove adoption, assess the performance of electric stoves to select efficient stoves that may be promoted in Ethiopia and evaluate potential impacts of electric cooking on the power and energy demand on the grid. The component will carefully assess the potential gains and bottlenecks for households to transition to e-cooking as the main objective of the component will be to pilot efficient electric cookers in selected sites in Ethiopia where there is capacity to transition from conventional cooking fuel and where markets exist. This will be implemented in

partnership with relevant stakeholders including MoWIE, Ethiopian Energy Authority, relevant NGOs and private sector actors.

EnDev Ethiopia will continue to **strengthen sector industry associations** (ICS associations and Ethiopian Clean Cooking Alliance Association (ECCAA)) and provide capacity building and institutional support as an industry voice to effectively participate in policy and strategy dialogues, enhance competition and fair play, enforce quality of products and sound business practices, as well as serve as the institutional instrument for their membership to leverage financial and other market services. They will in addition act as a platform for local and international business / market linkages thereby expediting sector growth.

The component will facilitate increased international and national **Private Sector Investment** through supporting market promotional campaigns. This will be through the supported industry associations, introducing financing mechanisms supported by the EnDev financial systems development component, and implementing support instruments such as **Results Based Financing** and all-round BDS (through training institutions that shall be supported to provide standardized quality trainings), hence increasing market demand for ICS and CCS technologies, making the sector more attractive for investment. The component aims to identify and support at least 5 large local companies in the cooking energy sector to have more market-oriented business plans and produce at semi-industrial level. In addition, it is also expected to promote at least 5 briquetting plants (large and small scale) with forex permitting<sup>36</sup>.

**Youth and Gender empowerment** will continue to be central in EnDev's strategy by incorporating gender mainstreaming aspects in the modification of ICS, e-cooking and other CC technologies for better usage by women (identifying partners with ability to modify the technologies and supporting the prototyping, piloting and introduction to market based on assessed demand). Opportunities for youth involvement will be explored further with partners to identify key entry points as business service providers, trainers, technology testers, biomass waste collectors, among other possibilities.

In this programming phase, EnDev Ethiopia shall continue its partnership with SNV, incorporating SNV into the component's implementation approach. EnDev Ethiopia will further support the sector through follow-on activities to the previously parallel RVO funded "Strengthening Enabling Environment of Clean Cooking Sector (SECCS)" project and the EnDev component of **SECCS II project**. This will include further strengthening of the Ethiopia Clean Cooking Alliance (ECCA) towards self-sustainability, supporting policy, strategy review and endorsement. This will include supporting the enforcement of clean cooking standards, strengthening national cookstove testing facilities and linking regional ICS associations to the ECCA for more inclusive representation of the clean and improved cooking sector.

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<sup>36</sup> The production equipment is being sourced from national importers who have the required documents to access forex to import the machinery needed. The component will monitor the situation closely and make contingency plans if the forex access is determined to be an issue for importers.

Through the enhanced market-based approach, promoting cooking energy access, teaming up with local and international partners to increase impact and relevance and accurately accounting for its results and working efficiently, transparently and in a cost-effective manner, the component shall contribute its share to the EnDev vision: Energising Lives, Energising Opportunities and Energising Climate.

- 4) **Financial Systems Development component:** This component was newly established in the 2019 EnDev programming phase to contribute to the improvement of an enabling environment for investments in off grid renewable energy and energy efficiency sectors in Ethiopia. Scoping studies recently conducted by the component revealed that the Ethiopian economy in general suffers from 1) A limited private sector due to dominance of the government sector in the economy and investment activity; 2) An overly prescriptive legislative and bureaucratic business environment making doing business difficult and expensive; 3) A heavily centralised and poorly capitalised financial sector, depriving liquidity and access to forex across the board; 4) A strong national trade deficit leading to severe foreign currency shortages and inflation; 5) External shock due to the COVID-19 pandemic, internal civil unrests and other natural disasters such as the significant locust invasion. The 2019 World Bank's Ease of Doing Business report (EODB) ranked Ethiopia 159th out of 190 countries; an improvement of two positions from that of 2018.

This heavily constrained economic environment severely limits the growth of the energy sector as well. Despite the very ambitious plan the Ethiopian government has put for its NEP 2.0 to achieve universal electricity access by 2025, to date only a handful of Lighting Global solar kit distributors exist in the market, and only two mini-grids operators have been licensed. The improved cooking sector is not scaling, and energy efficiency measures are not being promoted across the sector to any impact. If the goals set by the NEP 2.0 are to be achieved, the energy financing sector needs to be reviewed to facilitate scale for the private sector.

The key bottlenecks and hinderances to the overall development of a smoothly functioning financial sector in supporting access to energy in Ethiopia are: 1) the inability of non-local foreign investors to access forex for importers and their inability to participate in local distribution and retail; 2) the inadequacy of the local banking system (commercial and MFI) to understand and underwrite SMEs; 3) the stifling bureaucracy in the loan review and approval process, and, 4) the restrictive regulatory environment and slow pace of reforms. In Ethiopia, SMEs in the energy sector are often faced with the so called "missing middle". While MFIs primarily cater for micro firms, leaving small and medium firms financially excluded, large banks are discouraged from serving this segment primarily because of perceptions of lower returns and higher risk. The current business management capacities of most of the energy SMEs is also low further reinforcing this perception by the commercial banks.

Going forward, EnDev Ethiopia will add momentum to the measured shift the Ethiopian government is making towards liberalization of economic sectors which were previously fully state controlled. Examples towards this shift include: allowing the private sector to invest in air transport and postal services, engage in the import and export of as well as the transmission and distribution of electricity partnering with the state, some loosening of restriction in the PAYGO sector, allowing for non-bank actors to make payment collections,

albeit without charging interest and a general widespread acceptance that foreign investors are a critical developmental component, as witnessed in the focus on industrial park development.

EnDev Ethiopia plans to mainly focus on supporting the further development of the key linkage to **telco-driven, fintech-platformed mobile lifestyle system – inclusive of mobile money system**. This would go hand in hand with the focus of this programming phase on supporting the digitalization of the energy sector in all its spheres of engagement. This measure shall promote entrepreneurship, help to bring down bureaucratic barriers, ease the payment and settlements environment, ease the cost of doing business and bridge the divide between the population and the governance system.

In coordination with other development partners, EnDev Ethiopia shall pursue or contribute in the discussions towards the creation of a forex guarantee fund and further development of the capacity of the private sector to ably access it, deployment of measures to mitigate against the heavy collateral restrictions that the private sector faces, development of mechanisms to utilize in-country forex reserves of the private sector players to cross finance private sector needs, and as well ease of process bureaucracy and regulatory restraints in the whole energy financing sector.

## 1.7.2 Theory of Change (ToC) and the state of market

- I. **Electrification:** The national electrification rate in Ethiopia currently stands at only **44% (2019)** – out of which **33% is on-grid and 11% off-grid (ref. NEP 2.0, 2019)**. This severely limits income generation possibilities, poverty alleviation and social service delivery according to the National Electrification Plan 2.0 (2019) and the recently launched Ethiopia's Ten Years Development Plan (2021-2030), which replaced the Growth and Transformation Plan, GTP II (2016), especially in rural areas. Grid-electrification does not progress fast enough to reach the planned 65% country-wide coverage by 2025, and off-grid solutions are expected to fill the gap for more than 35 million people.

In comparison to its potential and neighbouring countries, Ethiopia's solar market is still relatively nascent. It currently has at least eight major companies in the market offering a range of solar PV solutions for use at the household or pico-solar and institutional levels. However, the majority of these companies operate in only four regions of Amhara, Oromia, SNNP, and Tigray. While the largest off-grid markets are in these regions, there are still opportunities for off-grid energy in markets that have been largely untapped by the larger, well-known solar companies. The reasons for these untapped markets vary, but one of the limiting factors is the instability of the regions (such as Benishangul-Gumuz, Somali and Gambella), and due to the remoteness and inaccessibility of some of the areas. Furthermore, the off-grid sector is plagued by a range of challenges preventing them from growing and reaching scale faster. For standalone solar products (pico-PV, Solar Home Systems and institutional solar PV systems) the core problems observed are: 1) limited local availability of supply and installation capacities/ institutionalized training offers, 2) prevalence of low-quality products and services, as well as absence of standards in the rural solar PV market, 3) limited access to growth capital for solar companies and financing for end-users, 4) absence of PAYGO business models and enabling conditions, 5) heavily constrained access to

forex, 6) restrictive import regulations for solar PV components, and, 7) insufficient sustainability measures for institutional solar PV systems due to central and local government's lack of understanding/planning for maintenance procedures. For mini-grids as a potential off-grid electrification solution, there has been insufficient increase in the number of new mini-grid projects to date for the market to grow in an accelerated fashion. As a result, mini-grids are still a nascent sector and therefore still not yet serving as a bridge between on-grid and off-grid areas, hence not (yet) proven as an option for off grid electrification. Regulatory and supportive policies and framework for mini grids are consequently not yet fully in place. Transparency towards investors in planning of grid expansion and the lack of organized, accessible and reliable data still lacks, further aggravating the situation. To be able to meet the ambitious targets set in the NEP 2.0, it will be necessary for the sector to increase the numbers of new mini-grids and promote the market-driven dissemination of stand-alone systems, eventually leading to a roll out of off-grid solutions as an option for national electrification.



Theory of Change: EnDev Ethiopia - Mini-Grids							
	Emerging Lives - Social development			Emerging Opportunities - Economic development			Emerging Climate - Combating climate change
<b>Impacts</b>	<ul style="list-style-type: none"> <li>Health. Electricity can be useful for agro-processing and small service business (mills, shops...), which generate jobs and income. Expenditures for candles and kerosene/gasoline decrease. Food processing and refrigeration allow an improvement of diet, contributing to reduction of hunger and malnutrition.</li> <li>Electricity can reduce the time females spend on household tasks such as collection of fuel wood. Therefore, they have more time to study and become literate. Other jobs traditionally reserved to women such as stockkeeper or craftworks may improve with the access to electricity. Public lighting improves public safety in rural communities, which is very important for women.</li> <li>Education. Electricity means that students can study during evening hours and spend less time in energy related activities such as collection of firewood. Power supply in schools attracts teachers to rural areas and allows use of multimedia tools.</li> <li>Gender. Electricity can reduce the time women spend on household tasks such as collection of fuel wood. Therefore, they have more time to study and become literate. Other jobs traditionally reserved to women such as stockkeeper or craftworks may improve with the access to electricity. Public lighting improves public safety in rural communities, which is very important for women.</li> <li>Child health and maternal health. Electricity decreases indoor air pollution of kerosene/gasoline smoke and candles and improves safety around the house. In addition to the better diet and more hygienic cooking conditions, mothers and children can benefit from improved medical service. The electricity supply enables refrigeration, adequate lighting, telecommunication and use of medical technology, which in turn, permit vaccination, sterilization and an improvement in time and quality of the medical service. Electricity supply also allows the use of ground water pumps, thus water borne diseases due to contaminated surface water can be decreased.</li> <li>HIV. Covid etc. Electricity contributes to the general improvement of medical services (keywords: access and refrigeration) and awareness of diseases risks due to campaigns on radio and TV.</li> </ul>			<ul style="list-style-type: none"> <li>Electricity will pave the way for Private Business. Electricity and EnDev's targeted intervention to promote and develop Productive use of Energy will increase income and economic development</li> <li>Electricity to improve the Cooperatives. Together with the FCA (and existing cooperatives in the communities) EnDev's development of Productive use of Energy will also investigate if current cooperative can be expanded, modernized or new could be added</li> <li>Electricity to drive private and cooperative business will create jobs and income for more people</li> <li>Implementation of a market economy will increase the overall understanding of this works, increase trade and entrepreneurship further supporting the economic development</li> </ul>			<ul style="list-style-type: none"> <li>Households, businesses, cooperatives and institutions will substitute fossil fuel generated electricity for appliances and light with CO2 free electricity from solar panels</li> </ul>
<b>Assumptions</b>	Communities suitable for mini-grids get electricity and improved institutional service and local business (productive use of energy) will attract investment and grow	Financial System (Blend of public and private funds) for faster and efficient roll out of mini-grids (it is expected that MoWIE will be the vehicle for mini-grid subsidy from the World Bank, African Development Bank and Ethiopian state. The FCA and communities act as viable entities and can access private loans i.e. with the mini-grid hardware as collateral - there are funds from the FCA. Further, the regional governments is expected to continue their support to rural development)	Digitalization of the sector for better decision taking based on facts, planning and verification for payment of subsidy. Viable mini-grid sites identified, developed, procured, installed, and tested and commissioned	Private sector participate in Engineering, Procurement and Construction of fair priced mini-grids	Enough sites to maintain a 3rd party mini-grid service sector	Mini-grids on viable sites (aligned with the spatial planning) are identified, developed, procured, constructed, commissioned, and they are all running smoothly :-)	Gender equality on business development in rural areas and people under impact have a say. Environmental and Social Impact Assessment to make sure that we do no harm.
<b>Outcome</b>	Communities, regional government partners and the Federal Cooperative Agency (buyers of mini-grids), and private and cooperative financing institutions can deliver viable conceptualized solutions for economic growth in the rural communities	Communities, regional government partners and the Federal Cooperative Agency (buyers of mini-grids), and private and cooperative financing institutions and a department for issuing subsidy from Ministry of Water Irrigation and Energy have the institutional and human capacity to financially verify and approve mini-grid projects and business plans	National spatial electrification planning can identify mini-grid sites viable for subsidy, and mini-grid buyers can navigate the framework conditions to finance and hire consultants to develop, oversee procurement and construction, and perform test and commissioning of mini-grids	A clear framework for transparent two step tender procedure, and a clear directive for mini-grids (including technical standards and quality) communicate the private mini-grid sector the tier of electricity, design, price and conditions for fair competition	Mini-grid owners (cooperatives) has the capacity to manage and operate the installations, and financial strength to buy regular 3rd party maintenance of all critical parts and works on the mini-grids. (3rd party maintenance must be insured to replace if they cause damage)	All mini-grid stakeholders can operate in line with regulations and policies and take the responsibility they need to secure trouble free and sustainable electricity supply. Further, the NATIONAL cooperative framework is in place and the regional government's energy bureau support the rural development participating in working groups to form the cooperatives	Easy for women to start small business' and cooperative agreements include people under impact of electricity. ESIA to reduce risks from the projects
<b>Assumptions</b>	People in the rural areas, government institutions, financing institutions and productive users of electricity know what electricity supply they can expect. They know that they got security for supply, and they row the tariffs enabling them to do realistic business plans	Mini-grid buyers know what financial support they can expect (and what they have to finance themselves)	Digitalization as a planning tool to verify if the mini-grid site is viable. This will also set a number and market potential for mini-grids, and guide mini-grid buyers forward on the sequence of interventions to implement a mini-grid	Private sector got a clear role and can participate in Engineering, Procurement and Construction of fair priced mini-grids	Technicians ready to service mini-grids (most likely they will come from mini-grid installers) and cooperates got financial strength to pay for it	There is a full understanding and clarity on responsibilities and roles on cooperative owned mini-grids	Regional government's policy supports development of productive use of electricity for women and MFIs have clear templates on how this should be implemented. Template for ESIA in place.
<b>Outputs and results</b>	<ul style="list-style-type: none"> <li>Finance from MFIs, private banks and peoples own funds develop Private Productive use of Electricity</li> <li>Finance from FCA, community and government develop cooperative business</li> <li>Regional government got a financed institutional development plan in place and implement it</li> <li>The electricity cooperative can capitalize PUE and have a sustainable economy</li> </ul>	Attractive (realistic) conditions for mini-grid buyers in place.	Public accessible web based GIS map on potential mini-grid sites for transparent selection and presentation (political preferences can also be included, this just increase transparency)	The national roll out of mini-grids can be upscaled, number of jobs in the sector can be increased, and thousands can get access to electricity	Technicians trained, mini-grid operators and managers trained	Policy documents, finance and regulation on mini-grids in place to define: Stakeholders roles and responsibilities, including what should happen with assets when the grid arrives.	Policy and finance from MFIs in place to back up on productive use of energy from women. Support measures for people impacted negatively from the project. Environmental safe, Covid-19 measures in place
<b>Key interventions</b>	<ul style="list-style-type: none"> <li>TA for collaboration with MFIs and private banks to implement PUE. Including biz plan for PUE owners</li> <li>TA for collaboration with the FCA and gov. stakeholders to develop cooperative business</li> <li>TA supporting regional governments conceptualizing rural development in electrified communities</li> <li>TA for cooperative formation and the cooperative's business plans</li> </ul>	<ul style="list-style-type: none"> <li>TA on development of financial systems, financial framework conditions and mini-grid business plan development</li> <li>TA on definition on roles and institutional development to support national roll out of mini-grids. FCA and communities are buyers of mini-grids, MoWIE's department for rural electrification (NEP2) together with the EEU define where mini-grids can be implemented (spatial planning, digitalization) a new independent department at MoWIE issue subsidy (the WB and AfDB loan/fund). If the application is approved and they can start. The EEA directive sets the technical specifications</li> <li>TA to the FCA enabling them to advise the cooperatives</li> <li>TA to the Regional Energy Bureau etc. on how to conceptualize and support/form on mini-grids in rural areas</li> </ul>	<ul style="list-style-type: none"> <li>TA for digitalization of the existing national grid, grid extension plans and areas for off-grid electrification (combine the plans from the EEU, NEP2 and regional governments)</li> <li>Development of an Ethiopian electrification planning tool to prioritize interventions on grid extension and off-grid solutions (mini-grids and Solar Home Systems)</li> <li>TA for institutional and human capacity building, training (in MoWIE and the EEU)</li> <li>TA for technical support on software, hardware, data safety etc. to run digitalized spatial electrification planning (Who should own and have the responsibility for the system)</li> </ul>	TA to develop conceptualized transparent Engineering, Procurement and Construction tender procedures coordinated with requirements for subsidies (The site is listed in the planning tool as a mini-grid site, the application for subsidy has been approved, the FCA (and the community) is ready to invest, two step transparent tender procedure in place, the market can deliver the right technology and quality (the directive for mini-grids) so that the financial institutions can invest in PUE for sustainable economy etc.)	<ul style="list-style-type: none"> <li>TA to develop an apprenticeship for service technicians (to make sure that they got the qualifications needed for an insurance company to issue an insurance for them)</li> <li>TA for due diligence between cooperatives, the FCA, 3rd party maintenance company and insurance company</li> </ul>	<ul style="list-style-type: none"> <li>TA to develop Environmental and Social Impact Assessment regulation/guideline</li> <li>TA to develop national regulation for cooperative owned mini-grids (other framework conditions captured in the other interventions)</li> <li>TA to develop a template for site specific regulations on the relation between customer (member of the cooperative) and the electricity cooperative. What connections are available, what happens if you do not pay, energy efficiency (energy justice), how can you become a member etc.</li> </ul>	TA to develop policy and business plans for the MFIs and the business owners, measures for people under impact (but not connected), Covid-19 measures and template for ESIA.
<b>Barriers</b>	<ul style="list-style-type: none"> <li>Limited PUE potential for private businesses, new cooperatives and social institutional development (limited sale of energy jeopardizing the electricity cooperative's business plan)</li> <li>Retailers for i.e. LED light and energy efficient appliances cannot find the quality products they should (can't sell)</li> <li>Access to the community is seasonal and therefore the supply chain to keep the businesses alive can stop (no beers for the bar's fridge)</li> <li>Limited positive track record from the rural areas the financing sector is not interested in doing due diligence and finance development of PUE</li> <li>Governments funds for conceptualization of rural development not adequate to reach economical sustainability</li> </ul>	<ul style="list-style-type: none"> <li>Due to lack of transparent planning and government funds there are not enough projects in the pipeline</li> <li>Lack of political will to reform the sector that much (they leave the initiative mandate to electricity, to others. This can have political impact)</li> <li>Mini-grid buyers cannot oversee the complexity of procedures and opportunities and give up</li> <li>No tradition for this - skepticism</li> <li>No funds from the WB and/or the AfDB</li> <li>Private banks not interested</li> </ul>	<ul style="list-style-type: none"> <li>There is a will to reform the sector. However, the high degree of transparency could increase public pressure for results, and Ethiopia might not be ready for the political risk.</li> <li>Mini-grid buyers do not understand and/or for political (or other) reasons refuse transparency in the planning process</li> <li>Due to lack of funds and/or qualified staff the institutional development is too slow and there are no results</li> <li>Private sector does not engage in this and/or the price is too high.</li> <li>Number of projects below a critical number</li> </ul>	<ul style="list-style-type: none"> <li>If there is no political will to support this development (by implementing the institutional development etc.) the number of mini-grids will be below a critical number, no competition, high prices etc. and the market will stall</li> <li>If the number of projects is below the bar the sector cannot sustain a trained work force</li> </ul>	<ul style="list-style-type: none"> <li>If there is no political will to support this development (by implementing the institutional development etc.) the number of mini-grids will be below a critical number and the market development will stall</li> </ul>	<ul style="list-style-type: none"> <li>A directive is in place. However, lack of coordination and political will to further coordinate the sector's frameworks could jeopardize the development</li> </ul>	<ul style="list-style-type: none"> <li>Cost for developing very small businesses to support women can be too high compared to what you can earn</li> <li>No willingness to pay extra to cross-subsidize the most marginalized</li> <li>Community not prepared, or cannot afford, to follow measures from the ESIA thus worsening the situation for the environment and the social situation</li> </ul>
<b>Assumptions</b>	Without PUE, institutional development and regional governments interventions to support and develop a strong economy in the community, the cooperative cannot sell enough electricity to cover the maintenance costs (OPEX), they will go bankrupt and the investments are lost. Therefore, Mini-grids will be seen as not viable for rural electrification in Ethiopia	The federal government do not have the institutional and human capacities to do it and the WB and AfDB backs out	The federal government do not have the institutional and human capacity to do it and the framework (the planning tools) cannot be implemented	If the roles, responsibilities, requirements, and rules are not defined, the transparency disappear and prices will go higher than accepted and mini-grids will not be implemented	Not enough 3rd party service providers will jeopardize sustainability and investments can be lost	<ul style="list-style-type: none"> <li>As long as the ownership and responsibility is not settled, mini-grids will not be properly economically managed and they risk to go bankrupt</li> <li>As long as the responsibility is not settled, mini-grids will not get the supervision from the government and the FCA they need to maintain themselves</li> </ul>	<ul style="list-style-type: none"> <li>Lack of financial support from MFIs is a risk for gender mainstreaming and Covid-19 measures.</li> </ul>
<b>Root cause</b>	<ul style="list-style-type: none"> <li>Financing institutions (MFIs, banks and the FCA) do not consider investment in rural businesses as viable, attractive and safe (profitable for them)</li> <li>Lack of knowledge, understanding, and acceptance that electricity customers (productive use of energy customers including cooperatives) must pay cost reflective tariffs to cover up for all Operational, Managerial and Maintenance costs</li> <li>The regional governments have rural development plans; however, rural electrification with tier 3 electrification and cost reflective tariffs is new for them, therefore they do not have a clear concept for taking advantage of this and support development of productive use of energy</li> <li>High subsidy for electricity from the national grid in precedence for low tariffs, and communities see electricity as a benefit from the government. Due to this cost reflective tariffs is seen as unfair. There is no subsidy in place for off-grid electricity!</li> </ul>	<ul style="list-style-type: none"> <li>There is no government framework in place for paying subsidies for mini-grids - no political will</li> <li>Electrification, national grid expansion, is seen as a role of the EEU, and mini-grids have been seen more as experiments than an actual solution for rural electrification. The national grid is heavily subsidized (paid by the national government), and the EEU do not have a clear interest in developing mini-grids</li> </ul>	<ul style="list-style-type: none"> <li>Government does not have a framework to digitalize rural electrification data to identify and approve sites for rural electrification, combine this with a national grid expansion plan from the EEU, and put it into a context of a digital NEP(3), the power sector reform. Paying subsidy from the Ethiopian government, an agency or institution within the planning circle will have to approve that this is a valid mini-grid site</li> <li>Digitalization of energy in Ethiopia is fragmented and not coordinated and institutionalized for better decision taking</li> </ul>	<ul style="list-style-type: none"> <li>The number of mini-grid projects is below a critical number to maintain a skilled workforce, and the low human capacity is not ready to up-scale</li> <li>The framework of doing mini-grids and 3rd party maintenance is not clearly understood by the providers, and prices are too high and/or the gap of expectations is too wide.</li> </ul>	<ul style="list-style-type: none"> <li>The mini-grid directive is in place. However, there are no policies, financial framework or definitions on roles and responsibilities in place on how to support and push the roll out of mini-grids forward.</li> <li>There are no regulation and/or guidelines from the FCA on who is responsible for what, in all phases, from getting the idea to having a mini-grid in place</li> <li>The mini-grid directive includes what is happening when the big grid meets the small grid. However, this has not been tested in real life, and could make investors (for mini-grids as well as productive use of energy) dropping out. There is no precedence.</li> </ul>	<ul style="list-style-type: none"> <li>There is no gender mainstreaming and/or energy justice included in the existing mini-grid framework</li> <li>There is no clear guideline and/or regulation on how to do an Environmental and Social Impact Assessment (this is a requirement in the MG directive)</li> </ul>	
<b>Core problem</b>	<ol style="list-style-type: none"> <li>The expansion of the national grid does not keep up with the growing electricity demand, is over-subsidized and planned in an intransparent way</li> <li>Insufficient increase of numbers of new mini-grids (solar and/or MHP) limits access to electricity for communities in rural areas</li> <li>Insufficient growth of the market for Engineering, Procurement, Construction and 3rd party maintenance of mini-grids in Ethiopia limits access to electricity in off-grid areas</li> <li>The electrification rate in Ethiopia lies at only 27% in rural areas, which severely limits socio-economic development</li> </ol>						

Theory of Change: EnDev Ethiopia - Stand alone solar solutions																																												
Impacts	Energising Lives - Social development						Energising Opportunities - Economic development						Energising Climate - Combating climate change																															
	The hundreds of off-grid communities substantially improve due to increased quality and extent of services from essential social facilities such as health centres, schools, district community centres and so on well from the different government sector offices						Off-grid households, SMEs, cooperatives and specialty wastes and rural youth benefit from quality economic engagements through production use of energy and energy driven technologies and processes						The enhanced deployment of environment friendly energy solutions shall foster the green growth path that Ethiopia has chosen further strengthening the environmental protection measures taken and avoiding the emission of green house gases																															
Assumptions	The markets for biogas systems, waste to energy, micro wind power, micro hydro power and for stand PV electricity generation are competitive and vibrant													Increased supply of solar products and services means growing demand	Ethical affordability of solar products and services increases sales in rural areas		Higher system lifetime and performance increases reputation and credibility of solar PV in rural areas			Increased service and maintenance contracts for local solar installation companies strengthens the market for solar PV in rural areas																								
Outcome	The number of biogas installations increases for stand alone cover generation with good technical skill as biogas capacities are abundantly available in the market		The consumer financing schemes makes biogas plants for stand alone electricity generation more affordable for consumers		The local skill levels and the availability of the biomass, waste to energy, micro wind and solar technologies for stand alone electricity generation are abundantly and accessibly available in the market		Data and information for the development of MHP is available and accessible		The financing scheme put in place significantly reduces the upfront cost barrier to MHP plants for stand alone electricity generation		The quantity and quality of solar products and service providers has increased on the local market				Quality solar products have become more affordable for customers in rural areas		Higher system lifetime and performance due to increased quality of solar products and services			Central and local governments put sustainable frameworks and measures for already installed institutional solar PV systems in place																								
Assumptions	Biogas installation companies maintain and improve their skills continue		Biogas installation companies develop storage financial capacities expertise		Financing system is regularly updated and adjusted to properly anticipate the market		Awareness and skill levels of the private sector is consolidated and growing		Financing scheme is regularly adjusted to adequately address the needs of both the private sector and the consumers		The flow measurement data is correctly do related with the flow of potential energy, lines and are readily and regularly updated by the relevant stakeholders in the market		Financing system is regularly updated and adjusted to properly anticipate the market		Increasing number of local solar installation companies are competitive in quality institutional solar PV systems		Local solar installation companies, technicians and retailers are enabled to increase their supply of products and services and can offer them at lower prices		More international as well as local solar companies have the means to build on or extend their rural marketing and sales structures and create competition that is fair based on the price		International and local PV/GO service providers are able to provide their services using the established PV/GO structure			Central and local governments, include specifications of quality products for institutional solar PV systems in their tender documents		Quality standards for different solar products and services are enforced by solar industry associations and the government		Central and local governments know about service and maintenance needs and budgetary requirements		The standing of stand-alone solar PV in the national electrification plans is strengthened		Central and local governments are willing to include private sector companies in service and maintenance												
Outputs and results	Improved design and installation skills of local biogas companies		Improved financial standing of local biogas companies		Improved financial capacities and willingness to of consumers		Viable business models identified for waste to energy, biomass and micro wind power for stand alone electricity generation		Awareness and skills identified for waste to energy, biomass and micro wind power for stand alone electricity generation and the solar business models		There is an adequate and accessible financing scheme for the private sector and the consumers		Comprehensive flow measurement data for proposed processes is continuously and availability		A comprehensive data set (GCMs) of potential MHP sites (including well-researched information available and readily accessible)		There is a financing scheme for service and maintenance of MHP plants		Increasing number of local solar installation companies based on quality institutions of institutional solar PV systems		Regular training is provided by TICET and other training institutions for solar companies and technicians, and retailers on installation, repair and maintenance of solar PV systems		Key components for institutional solar PV systems are increasingly available on the Ethiopian market		Solar industry associations are formed and coaches in financial support opportunities, policy advice and advice work		Working capital loans are developed and made available for solar companies		Assessment study and training session for public relations on importance of institutional solar companies		Mobile money based PV/GO structure developed		Assessment study and training session for public relations on importance of institutional PV/GO service providers		Improved planning, marketing and implementation processes of government solar use identification releases		Solar industry associations are formed and coaches in quality control for solar products and services		Workshops and individual advisory on solar PV service and maintenance requirements		Directors and regulators for product, design and installation of solar PV systems developed and strengthened		Roundtable and mini-fair involving central, local governments and private sector companies	
Key interventions	Technical training and installation courses for local biogas companies		Development of a credit or loan scheme for local biogas companies		Development of a consumer credit or loan scheme for biogas		Put in place a programme to investigate the viability of the technologies for the Ethiopian context and pilot some alternatives to establish viable business models		Put in place an awareness raising and skills development programme to raise technologies and business models		Put in place appropriate financing scheme for both the private sector and consumers		Put in place a flow measurement regime		Conduct a country wide mapping to identify potential sites		Development of financing scheme for MHP development for the private sector and consumers		Local companies receive installation contracts and the training to quality conditions of institutional solar PV		Technicians, retailers and solar companies and get high quality technical training through the services of TICET through the other training institutions		Technical advice for central government on regulatory support opportunities and foreign financing alternatives for private solar sector		Capacity development of solar industry associations in international financial support opportunities		Development and provision of training capital loans for solar companies to reach out to rural areas		Technical advice to policy makers on strong market entry barriers for solar companies and the growth of the local market and technical capacities		Technical advice to policy makers on the creation of a sustainable based PV/GO structure		Technical advice to policy makers on financing models and barriers for large intermediate PV/GO service providers		Technical advice for central and regional governments on planning, marketing and implementing quality identification releases		Capacity development of solar industry associations in marketing, financing and planning for and financing quality identification and control		Technical advice for central and regional governments on service and maintenance requirements		Development of a minimum standards a minimum MHP standards for solar PV systems and standards for government - non government solar PV		Developing and pilot a results-based financing scheme for service & maintenance of institutional solar PV systems	
Barriers	Lack of opportunities for practical training & experience of local companies in designing and installing biogas systems													Lack of credit or loan scheme for local biogas companies	Lack of consumer financing scheme	Lack of sustained well planned measures to investigate the viability of the solutions and introduce them in the market	No established flow measurement regime for solar products and services	No systematic survey and auditing work or programme in place	Lack of consumer financing for MHP	Lack of opportunities / programmes for practical training & experience for local companies in installation, maintenance and repair of solar PV, SME and institutional solar PV	Restrictive import regulations for solar PV components in Ethiopia	Check- and benchmarks for local and international procurement difficult to access for local solar companies	No financing or leasing mechanism for customers of solar PV products and services in place	Insufficient awareness about quality criteria for solar PV products	Central and local governments are not aware of service and maintenance problems of institutional solar PV, a lack of private sector engagement in Government led solar PV identification																			
Assumptions	Without practical installation training and experience, biogas companies do not get contracted		Local biogas companies have to finance biogas plants to meet the demand for their systems and services, biogas companies do not get contracted		Consumers have limited of access to finance, to be able to purchase the biogas systems		There are no pilot sustainability programmes to encourage the technology adoption		Very few installed systems, but not to the level of being pilots in specific areas		Most users and operators are believed to be highly motivated but not motivated data is available		The relatively long planning time and some physical infrastructure required increases the cost		The intention to proper and practical installation, maintenance and repair training and experience, solar companies do not get contracted		Local solar companies are not able to MHP or increase their stock of materials, which leads to capacity and hence higher prices		Only few larger companies are able to provide required solar products and services and can drive up prices as there is low competition		Cheap price (lowly low quality) solar products are being purchased by the consumers		Low quality products can enter the Ethiopian solar market with less difficulty as compared to high quality products		Central and local governments do not budget for service and maintenance of institutional solar PV		Private sector companies in the area of solar PV has social infrastructure in place		Central and local governments are not able to effectively address and maintain institutional solar PV by themselves															
Root causes	Limited local availability of supply and installation capacities for stand-alone biogas system		Stand-alone biogas systems are expensive		Limited local availability of MHP biomass, waste to energy technologies and related skills		Limited flow data for potential sites for MHP		The upfront cost for building MHP plants / technology is high		Limited local availability of supply, installation, repair and maintenance capacities for stand-alone solar PV systems		Solar PV products and services are expensive		Prevalence of low-quality of products and services in the rural solar PV market		Prevalence of dependence on inefficient and unsustainable energy use for different services where practical (biogas and inefficient appliances and biomass for heating and lighting - that could have been sustainably substituted by solar, wind and efficient appliances		Insufficient sustainability measures for solar PV systems of social institutions																									
Core problem	The national electrification rate in Ethiopia is at only 44% (2019), and there is insufficient growth of the market for stand-alone PV systems (ranging from Pico to kWw), MHP, biogas installations and other biomass and waste to energy stand alone electricity generation in Ethiopia limits access to electricity in off-grid areas and that severely limits income generation, poverty alleviation and social service delivery in the off-grid areas (according to the National Electrification Plan 2 (2019) and the Growth and Transformation Plan II (2016))																																											

**II. Cooking:** Given the current growth rate in the clean cooking sector in Ethiopia, it becomes clear that the Climate Resilient Green Economy (CRGE) target will not be reached unless some drastic measures are put in place. The underlying major problems in the cooking energy sector are that there is still low uptake and adoption of clean cooking technologies; limited use of clean cooking fuels; and still a weak enabling environment in the clean cooking sector. This is largely due to lack of investment in the sector with a weak local private sector. A number of them join the market with support of government and NGOs every year but drop out for various reasons. No comprehensive study is yet in place to determine the number of businesses and actual volume of the market. EnDev is currently conducting an assessment to determine the status of the market. Though many players are in the sector, there is still a lack of coordination. In addition, absence of a strong common platform to advance the adoption of clean cooking solutions at scale leads to a lack of conducive clean cooking policy environment and implementing strategies. Undeveloped or unstructured markets leads to lack of quality considerations leading to significant differences between local and international product standards. To strengthen and sustain a vibrant (local) market for clean cooking solutions and conducive enabling environment of clean cooking sectors, the sector will need to shift to semi-industrial production of quality cooking energy products, production of clean cooking fuel at scale and ensure a functional, inclusive and focused clean cooking institutional capacity and cooperation frameworks.

Theory of Change: EnDev Ethiopia - Cooking Energy Component							
	Energisng Lives - Social development		Energisng Opportunities - Economic development		Energisng Climate - Combating climate change		
<b>Impacts</b>	Off grid households / communities substantially improve their lives due to increased access to clean and reliable cooking energy solutions at their homes and at community levels by accessing essential services.  Use of cooking energy solutions will lead to reduction of indoor air pollution and improvement of health for end-users.		Sustainable and vibrant market for clean cooking solutions and conducive enabling environment of clean cooking sectors strengthened at national and regional levels.  Off grid households, SMEs and Cooperatives and specially women and rural youth benefit from gainful economic engagements through productive use of cooking energy solutions.		Cooking energy solutions will enable end users to conserve natural resources and lower CO2 Emissions.  The enhanced deployment of environment friendly cooking energy solutions shall foster the green growth path that Ethiopia has chosen and further strengthen the environmental protection measures and avoid the emission of green house gases.		
<b>Assumptions</b>	Affordable and appropriate clean fuel and clean cooking technologies exist as well as supportive financial mechanisms	Supply of clean cooking technologies is ensured by producers.	Willingness to pay and other behavioral change barriers are improved	Households continuously utilize alternative clean cooking fuels due to observed benefits.	Strong Coordination among stakeholders(public , private and civil society) and policy & institutional framework	Clear, standardized curricula and training manuals and partner commitment is in place.	Active stakeholder platform is in place.
<b>Outcome</b>	Reliable testing services are in place and clean cooking products are produced at scale.	Due to loan package, technology is affordable to end-users	Increased number of private sector players in the clean cooking technology	Increase of willingness of end-users and behavioral change to consume clean cooking technologies.  increased number of people get access to clean cooking technologies and fuels.	Increase in number of skilled manpower in the sector	Functional national alliance and regional associations for clean cooking are in place (coordinated collaboration among stakeholders in place).	Clean cooking solutions, policies, frameworks, standards and certification schemes are developed
<b>Assumptions</b>	Affordable and appropriate clean fuel and clean cooking technologies exist as well as supportive financial mechanisms		Supply of clean cooking technologies is ensured and willingness to pay/behavioral change barriers are improved.		Households continuously utilize alternative clean cooking fuels due to increased awareness of benefits associated with clean cooking technologies and fuels.	Strong Coordination among stakeholders(public , private and civil society) to support the institutional framework is in place	Increased quality of clean cooking fuels and technologies are in place in the country.
<b>Outputs and results</b>	Increased number of financing institutions for availing loan schemes for clean cooking technologies to be produced.  Cost of clean cooking fuels is significantly reduced .  Producers get working capital for mass production and able to access to outskirts areas to meet end-user demand.  State of the art testing facilities established and in use by private sector investors.		Marketing strategy is in place and marketing tools are developed accordingly.  An increased number of end-users purchase clean cooking fuels.  Increased availability of diverse clean cooking fuels that is within close proximity and accessible by the end-users.		Increased number of institutions providing training in clean cooking and an agreed training curriculum is in place.  State of the art testing facilities established and in use by private sector investors.	Cost of clean cooking fuels is significantly reduced as a result of regulatory bodies that are in place.  Action plans, guidelines and manuals that can translate policies and strategies in place.	Effective clean cooking communication platforms created.  Clean cooking knowledge management system in place.  Technical, financial and operational capacity of the alliance enhanced.
<b>Key interventions</b>	Facilitate innovative and sustainable financing scheme and avail loans to producers.  Adopt best business models worldwide and support establishment of companies.  Introduce incentive mechanism to service providers such as RBF.  Support the establishment of "state- of-the -art" testing and certification facility and promote clean cooking standards.		Extensive awareness and promotion on clean cooking technologies and fuels to innovatively change the behavior of end users towards clean cooking options.  Facilitate innovative and sustainable proce subsidy scheme to avail affordable products to end users.  support development of clean cooking knowledge management systems e.g. clean cooking database.  Engage end-users in product testing and ensure a user-centered approach is applied in production of clean cooking energy solutions.		Support the establishment of institutions to provide standard clean cooking trainings on development, production etc.  Support regulatory bodies to work on polices and frameworks (e.g. Tax exemption).  Establish platforms and advocate for collaborative partnership among relevant stakeholders( that includes politicians and high-level decision makers) and need of having focused agency. Establish and operationalize National Alliance for clean cooking.  Support development of clean cooking knowledge management systems e.g. clean cooking database.  Support the development of action plans, guidelines and manuals that can translate existing policies and strategies and also new ones when required (new policies and strategies).		
<b>Barriers</b>	<u>Supply side barriers</u>  Limited supply of high quality clean cooking technologies.  Limited number of high quality producers in the clean cooking technology.  Lack of adequate incentives to attract private sector investment.  Lack of materials locally to produce high quality products creating reliance on international markets that result in higher product prices.		<u>Demand side barriers</u>  Clean cooking technologies are not affordable for the beneficiary.  Clean cooking technologies are not accessible to end-users especially in rural settings.  Low sensitization on clean cooking technologies and their benefits.  Low awareness on clean cooking fuels among the beneficiary.		<u>Enabling environment barriers</u>  lack of concentrated attention towards clean cooking sector.  Limitation and /or absence of clean cooking focused instruments( Policy, Institutional setup, platforms and regulatory systems, etc.).  Weak coordination among clean cooking implementing agencies (public private and civil societies).  Absence of enforcement mechanisms e.g. On testing, labeling, warranty, certification and other regulations.		
<b>Assumptions</b>	Lack of sufficient funding for clean cooking sector. Insufficient private sector investment in the clean cooking sector.	Current project/programs are insufficient to exhaustively address the development of clean cooking sector	Insufficient awareness of benefits associated with clean cooking technologies and fuels	Lack of affordable, accessible and good quality clean cooking technologies	Lack of proactive government leadership to effect laws, policies and frameworks that can create an enabling environment for the clean cooking sector.		
<b>Root cause</b>	Producers lack financial capacity for mass production. Financial limitation of service providers to reach to the outskirts areas  Type of cooking technology developed uses expensive materials/design (e.g. Mirt with chimney is expensive). High investment cost on the technology is added to the fuel such as tax, procurement cost(machine), importation cost, etc..  Lack of attractive clean cooking technology business model for potential producers.		Lack of proper orientation and awareness of the improved clean technology to address willingness and behavioral change.  Absence of adequate awareness and promotion on clean cooking fuel.	Lack standardized and agreed curricula in clean cooking sector and limited institutions providing appropriate training to private sector.	Limited coordination among existing institutions in provision of trainings.	Absence of common platform to advance the adoption of clean cooking solution at scale.	Absence of comprehensively focused clean cooking agency on enabling environment instruments such as policies, strategies, standards and certification, etc
<b>Core problem</b>	Nearly 60 million tons of biomass is consumed for fuel with about 81% of the estimated 18 million households using firewood and 11.5% of them cooking with leaves and dung cakes with all its adverse effect on health, gender, environment and climate change.(Ref. DRAFT ETHIOPIAN ENERGY POLICY 2018)  Low absorption of clean cooking technologies (About 90% of the population use traditional cooking practice /device (sourced from Review of policies and strategies to the clean cooking sector in Ethiopia , SNV SECCS document)						

### 1.7.3 Transformative Character

EnDev Ethiopia's continued stronger focus on sector development support and financial systems development, as well as on market development and enabling environment development (for both electrification and cooking sector) is expected to lead to transformational changes and accelerated growth of both sectors. This is in the context of ambitious national strategies and programmes such as, CRGE, NEP 2.0, the recently launched Ten Years Development Plan (2021-2030), combined with a sustained expression of political will to gradually liberalize the finance sector.

#### Mini-grids component

##### Market development

Building on our proof-of-concept, we have a) established a reference point for cooperative managed mini-grids, b) elevated the dialogue on operational models, regulatory and enabling framework, and c) bridged institutional gaps for mini-grids into a recognized solution among our partners for rural electrification in Ethiopia. This is a very strong baseline for further development and partner coordinated upscaling.

Going forward, in the next phase, we will consolidate our experience, studies, and ongoing dialogue into a full package – sector support for a **national roll out of cooperative managed mini-grids**.

The enabling framework will be rooted in 1) the mini-grid buyers, 2) the cooperatives, 3) access to finance, 4) institutional build up to handle applications, 5. paid subsidies (before project development can start), and 6) a spatial planning tool for verification of the mini-grid site's viability (to be synchronized with the EEU's grid expansion plans and the NEP 2.0).

The implementation itself will build on the current EPC model with 3<sup>rd</sup> party supervision, the buyer's representative, leading to a national roll-out, leading to maintenance of several (off-grid) mini-grids. At the same time, a contract for 3<sup>rd</sup> party maintenance to safeguard the investment will be put in place. This will be combined with a broader capacity building in the mini-grid sector that will be addressed through on-the-job training as well as international partnerships, among others.

To reduce on imported mini-grids hardware and allow for roll-out to gain momentum, support to local manufacturing and/or assembling facilities to supply quality products to the market and compete with international players will need to be developed.

The vision is that a **strong, and attractive enabling framework** can transform the mini-grid sector into a skilled and sustainable business. This will support rural development, catalyze additional economic development, job creation and address gender mainstreaming.

##### Economic development

Our current experience already shows that mini-grids offering tier 3 and above electricity are key drivers for economic development in off-grid communities. The 8 intended mini-grids will foster 224 new productive use businesses (e.g. processing farm products, grain milling, refrigeration of perishable products, longer opening times of shops and restaurants, etc.), and

that as a result also see an increasingly better skilled rural workforce. The programme will further enhance its technical assistance to the mini-grid cooperatives and local governments to identify additional productive use applications that are suitable for the relevant rural economy. Due to the envisioned active private sector market for mini-grids, local workforce will develop specialized skills in the development, operation, maintenance and management of mini-grids. In addition, at least 45 of the SMEs (e.g grain mills, metal and wood workshops, hotels, agro (coffee) processing, recreation centers), making 20% of the targeted 224 SMEs) will be larger off-takers of the electricity, ensuring local productivity and supporting the economy in the cooperative as a whole.

### **Social Development**

EnDev's experience reveals that mini-grids improve service delivery from government institutions, clinics, schools, and social events. Further, increased economic activity from productive use of energy in general improves livelihoods. The next phase will aim at developing productive use of energy mini-grids to increase economic activity, improve livelihoods, and secure a revenue for the electricity cooperatives to pay for their operational costs, and remain economically sustainable.

Ideally, an **Anchor Load** and/or a **Key-Maker Model**<sup>37</sup> should be developed/supported for suitable sites. Some other sites would have to develop a variety of different smaller businesses to reach the same "electricity purchasing power" as an anchor load.

The electricity supply will also improve conditions for women and vulnerable citizens (e.g. through security lights, access to information, health care etc.). Special effort will be; a) to achieve energy justice, b) to connect as many people as possible at the lowest tariff as possible, and c) to mitigate the impact on those living within/near-by who cannot get connected.

Considering mini-grids' significant impact in reducing women's daily chores, particularly in female-dominated labor-intensive agricultural and food processing work where time can be saved for carrying out domestic activities in the evening as a result of lighting and the freeing up of women's time to participate in paid work. The work strand on ensuring equity in electricity supply will be further deepened and implemented in the next programming phase and this could have a long run effect to allow women to have more financial autonomy which leads them to the purchasing power of assets, decision-making ability, and leadership.

### **Solar Electrification and Market Development Component**

Supporting measures to improve the policy and regulatory frameworks and on-the-ground support to attract international private sector companies in the solar PV realm in Ethiopia can enable mobile money approaches such as PAYGO to take shape. The effect will be an expansion of local players in the field, hence a sustained market trajectory. Support of the Ethiopian Solar Energy Development Association (ESEDA) will strengthen a "voice of the industry" towards government on the enforcement of directives, on issues such as tax and quality

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37 Under the KeyMaker Model, the mini-grid company joins hands with the village community to exploit and market local natural resources for the benefit of all partners (see link)

standards and on the provision of institutional service for the private solar sector to enhance peer learning and competition to shape a healthy growth of the market.

### **Market development**

This component enhances the capacities of the solar PV private sector to effectively scale up business' operations and participate in the governance of the sector. This will be addressed through building capacity in the technical, financial and business management areas to increase sustainable, quality and reliable solar PV products in the market. It will support the local solar companies with a range of specific standardized, practical and quality capacity building measures for the installation, service and maintenance of institutional-size off-grid solar systems. Capacity development measures will be institutionalized in selected TVET institutions and included within MoWIE's installation standards, expanding the sector's capacity to larger government projects that are in the pipeline for the health- and education sectors. For instance, a government-run RBF model for system servicing and maintenance will be further explored and piloted with the main partner MoWIE and installing companies of the private sector.

### **Economic and Social Development**

The expansion of the solar market shall generate sustained employment in the solar sector as new SMEs emerge and franchises and business networks expand both in the solar PV direct retail market and in more evolved service provision such as PAYGo. Access to reliable off grid electricity shall foster productive use of electricity in the agriculture sector (e.g. water pumping, drying, cooling, and multipurpose energy hubs), in SME, manufacturing and services sectors. It also prevents the burning of candles, kerosene, and other highly polluting fuels which has a direct impact on women's health in terms of providing a safe birth environment at night.

Moreover, young people will be able to study and read at night-time, to watch/listen to news to access multiple information sources.

The project intervention shall focus on very remote health and educational institutions in areas considered to be risky and very poor for ordinary business and boost social service delivery where it will otherwise not happen in the near future (e.g. nighttime delivery, better education on sexual transmitted diseases, fertility level reduction due to family planning). This has been already revealed at similar past activities of EnDev in Ethiopia as well as other countries.

### **Lead Acid Battery Recycling**

#### **Market development**

The intervention aims at re-orienting the existing Used Lead-Acid batteries (ULAB) market towards sound ULAB-handling that is regulated and compliant with the current e-waste and hazardous waste legislation in Ethiopia. In order to achieve this, positive incentives are provided to private sector companies to transform their current recycling practices and benefit from increased supply of ULAB. For this kind of preferential treatment, a licensing scheme in form of competence certificates for ULAB collectors and recyclers will be developed in order to increase the business of compliant companies and push non-compliant ones out of this market. To initiate the transformation of the battery recycling market, EnDev shall provide



and facilitate the recycling facilities to access a subsidy of their capital expenditures ("CAPEX") for these upgrading measures. This will mitigate the investment risk and bridge the time until facilities gain larger shares of batteries from the ULAB market once the scheme is fully established. This subsidy is accompanied by training sessions for stakeholders across the ULAB value chain. The "pull-factors" for the transformation of the battery recycling facilities shall be complemented by "push-factors" that imply consequent enforcement of environmental legislation and standards and sanctioning of non-compliant enterprises. This is in particular crucial for the market development, as non-compliant enterprises would otherwise keep benefiting from lower investment and running costs and thus gain a competitive advantage against compliant market players.

Concerning the collection and recycling of less hazardous but nevertheless widespread dry cells and lithium-ion batteries, the development of an improved ULAB lifecycle management scheme will work as a steppingstone for an even more advanced scheme for other battery types in future.

### **Economic development**

the project intends to support the build-up of a sound lead-acid battery value chain, from the ULAB collection and transportation up to the recycling and sound disposal of batteries. So far, the annual amount of ULAB from the transport and industry sector is estimated to be around 8.000t and from the off-grid solar sector to be around 10.000t, with an estimated total market value between 28 million USD (lead scrap) and 45 million USD (properly molten and purified lead) respectively per year. This will stimulate further investments in a certified ULAB business sector which typically goes along with job creation and income generation. As the sector is currently informal and a strong engagement of people with limited employment opportunities, our interventions to move from an informal sector to a formal sector e.g. through enabling the business case will integrate the informal actors more carefully and lead to formal job creation. In addition, our interventions ensure that the environmental and health impact of unsound management of ULAB is minimized thereby protecting the poor.

### **Cooking Energy component**

The crucial transformational change that is key for achieving the overall target in the clean cooking sector is the existence of strong markets to absorb increased production and supply of ICS, e-cooking and CC technologies as well as alternative fuels e.g. biomass, that are affordable and accessible. Strong market approaches will be further explored for new value chains in the alternative fuels such as briquettes and pellets as well as ICS and CC technologies including e-cooking. The component is currently conducting studies to assess the potential of various cooking technologies including e-cooking and related climate for private sector investment and the existing markets that that can be scaled up based on assessed demand from the end-users.

The component will tap on the experiences from the implementation of the Strengthening Enabling Environment for Clean Cooking Sector (SECCS) II project, and its predecessor the RVO funded "SECCS" project.

The component will focus on institutionalizing trainings in the ICS sector as this will contribute largely to a sustained increase in quality skilled manpower and quality product supply in

the sector. This will in turn address the current production capacity of producers (both in quality as well as production at scale) that will be coupled with financial schemes to effect mass production (with focus on semi-industrial producers) leading to scale.

In addition, the component will focus on promoting strong mandated government nodal institutions such as Ethiopian Rural Energy Development and Promotion Centre (EREDPC) that will play a leading role in the sector development.

The focus areas of the cooking energy component are geared towards:

### **Market Development**

The component will continue to focus on developing suitable demand-driven markets for energy access technologies using market-based approaches and promotion campaigns designed to increase the demand from the population – mainly relating to household access to clean cooking technologies and fuels. The component is currently planning the development of a market-based strategy that will capture current market demands to inform further measures to be incorporated. In addition, and the component plans to enhance the capacities of the private sector to effectively scale up business operations using tailored business models to respond to the growing demand for these technologies and participate in the governance of their sectors. In addition, EnDev Ethiopia will continue to strengthen sector and regional industry associations and provide them with capacity building and institutional support as an industry voice. This way, the project supports the private sector associations to serve as an institutional mechanism for their members to leverage financial and other market services and enhance competition and fair play, enforce quality of products and sound business practices to **address market needs**. These are crucial foundations for the sustainable functioning and further growth of the ICS industries in the country.

### **Economic and Social Development / Productive Use**

The component promotes ICS and other cooking technologies as well as alternative fuels for private sector actors to generate increased financial benefits. The component will also aim to promote institutional ICS to social institutions such as health centres and schools, among others, and to SMEs that use heat energy for their processes (including restaurants, hotels and similar facilities) to increase access to productive use technologies in the improved and clean cooking sector. The component targets low-income households in deep rural areas, as well as refugees and host communities in displacement settings, hence adhering to the **“leave no one behind”** principle of EnDev.

## **Financial Systems Development component**

### **Market development**

This component supports the development of market stability that will facilitate the expedited growth of the local RE private sector and as well the entry of international private energy access companies into Ethiopia. Financial systems regulators, banks and MFIs in Ethiopia will be provided with customized advisory and technical support in creating national enabling environments for detecting and reducing the number of energy access system-relevant risks in the financial sector, encouraging the financial sector to become a key pillar of the energy access market both for the energy service providing private sector and consumers .

## **Economic development**

The financial sector will be supported to expand into the energy access market with different and customized financing products for the different sectors of the economy (e.g. energy access in the agricultural value chains, off-grid micro enterprises) specifically including low income households, women and other marginalized groups. EnDev will reduce the entry barrier for additional end-users who can then obtain energy technologies or services that may enhance productive applications in the rural settings. Moreover, SMEs will gain access to finance through loans, which will expand their productive use business operations.

### **1.7.4 Collaboration**

#### **Sector alignment**

All EnDev Ethiopia interventions address issues that are central to the Ethiopian Government's overarching development strategies and plans. The national Climate Resilient Green Economy (CRGE) Strategy highlights rural electrification through solar PV technologies and mini-grids as key measures. The National Electrification Programme (NEP 2.0) aims at universal access to electricity by 2025 through all means possible (65% on-grid and 35% off-grid). This is an overly ambitious target considering the gaps that the sector still witnesses. Strengthening the role of and attracting the private sector in the development of the energy sector as well as the potential of public-private partnerships coupled with proper planning and regulatory frameworks are highlighted as key in achieving these highly ambitious goals. Massive support of the electrification market as well as advising government-driven electrification projects regarding planning, implementation and sustainability is therefore highly in need. With regards to key political partners, the Ministry of Water, Irrigation and Energy (MoWIE) is and will remain the main political and implementation partner for EnDev Ethiopia at the federal level. Close collaboration and support to EREDPC will be pursued in cooperation with SNV Ethiopia and other key partners.

EnDev Ethiopia also closely cooperates with the ministries of Health, Education and Agriculture, and as well with the Environment, Forest and Climate Change Commission (EFCCC) in the planning and coordination of interventions. In the five main operation regions of EnDev Ethiopia (Amhara, Oromia, Sidama, SNNPR and Tigray), the Regional Bureaus of Energy, Health and Education and their sub structures at the district levels are the major implementation partners. Especially in the promotion of mini-grids, Regional Energy Bureaus are core partners of EnDev with considerable own co-financing. An additional region, Gambella, has a focus on energy in the displacement settings. In addition, EnDev Ethiopia collaborates and works through/ with other relevant government agencies, for instance Development Bank of Ethiopia (DBE), Ethiopia Energy Authority (EEA) and the Ethiopian Electric Utility (EEU). Finally, as part of the Energy Development Partner Working Group in Ethiopia, EnDev Ethiopia will continue to take a leading part in the productive use, biomass and mini-grids working groups and actively contribute to the coordination meetings and forge synergies with other actors. In addition, EnDev Ethiopia will continue to co-lead (together with UNHCR) the Energy and Environment working group focusing on coordinating partners energy interventions in the humanitarian/ displacement settings. Synergies are already immersing with members of the Development Partner working group, in particular the World Bank, IFC, UNHCR, AfDB and USAID.

EnDev Ethiopia also intends to continue the strategic collaboration with SNV Ethiopia for co-implementing parts of the EnDev Ethiopia Cooking Energy component. In particular, SNV's previously RVO-funded initiative for the establishment and development of the Ethiopia Clean Cooking Alliance will continue to be integrated under the EnDev Ethiopia umbrella. In addition, EnDev Ethiopia will enhance its close cooperation with GIZ SURED, GIZ Biodiversity BFP, ECCA, UNHCR, DORCAS, ZOA, World Vision, Concern World Wide, the Energy and Environment working group and the MoWIE EREDPC to achieve greater synergies and sector impact in the clean cooking sector including in humanitarian / displacement settings. The component will also seek to synergize where feasible with the Ethiopian National Improved Cookstove Programme to achieve greater synergies and sector impact.

Going forward in the next programming phase, EnDev Ethiopia will continue to adapt its programme to the evolving energy sector needs, with relevant private sector, public sector, financial sector, and policy development support interventions. Key ambition will be to move the energy sector to transformative scale by catalyzing exponential sector growth and market development. This will require to bring EnDev Ethiopia's approaches to scale, employ available resources more efficiently to support selected high potential market actors, and achieve attributable results by also supporting efforts from development and government partners.

To address the challenges in the cooking energy sector, different initiatives have been taken by the government and partners in the sector, for instance:

- National improved cookstoves programme based on improved cookstove national investment plan operated between 2012-2018;
- Development partners including WVI, UNDP, VITA, etc have also worked in clean cooking sector development and able to disseminate significant amount of ICS using different financial mechanisms including carbon finance and RBF;
- Private sector driven RBF ICS dissemination project financed by RVO through its SDG7 result facility scheme;
- National Biogas Programme Ethiopia (NBPE+) and its predecessor projects jointly implemented by SNV, MoWIE and regional energy bureau developed sustainable biodigester market and enabled to construct household biodigesters. Due to its benefit as organic fertilizer, enhancer of seed germination and etc, use of bio slurry became part of an extension Programme package of the Ministry of Agriculture;
- RVO funded and SNV implemented SECCS project support the sector through strengthening the enabling environment via policy and strategy support, institutional support and sector facilitation and promotion of standards;
- EnDev as one of the major players in the sector have been and still is working in product development, capacity building, promotion and marketing and continued the SECCS project, with notable achievement of strengthening the ECCA;

Despite all the effort mentioned above, the sector still is not strong enough to address the complex challenges of clean cooking issues. Hence, to ensure large scale dissemination and use of ICS/CCS in the Ethiopia, it is imperative to adopt a holistic approach that targets supply, demand and enabling environment components of the cooking energy sectors.

### **Implementer base**

The Programme aims to contribute to the transformational development of the clean cooking, stand-alone solar PV, and mini-grid sub-sectors and bring them to scale. This requires a multi-actor approach that brings the efforts of several development partners, government institutions, financing institutions, civil society and private sector actors together. Building on its existing strong partnerships with relevant government institutions at the national and local levels, strong partnerships with relevant development partners, and the finance and private sectors, EnDev Ethiopia will, in the next programming phase, further strengthen sector cooperation with and between key sector actors to achieve sector transformation and growth at scale. EnDev Ethiopia is already actively participating and contributing in the Energy Sector Development Partners Assistance Group meetings, that consists of all major development partners including several embassies, the energy and environment working group and in the regular and active participation of MoWIE. The programme will continue utilizing the advantage of having strong advisory and regional presence to bring practical advice and tangible case studies into the policy discourse and sector coordination to actively identify synergies for collaboration with others.

Specifically, EnDev Ethiopia will continue cooperating closely with the World Bank, IFC and the Shell Foundation in the continuous provision of technical support in the solar PV private sector in Ethiopia. This will include supporting the establishment and strengthening of the industry association (ESEDA and regional associations) as a consolidated voice of the solar PV private sector in the governance of the sector, as well as providing technical and material capacity building support for solar PV technicians and retailers. Furthermore, EnDev Ethiopia will enhance its current cooperation with the ADRA, GIZ education sector Programme (STEP) in the development of vocational education in the solar PV sector. Similarly, in the cooking energy sector, EnDev Ethiopia will enhance its close cooperation with the Ethiopian Investment Commission, among others to achieve greater synergies and sector impact.

### **Leverage / spin off**

Through close cooperation and joint implementation, EnDev's partners are increasingly adopting EnDev developed strategies and processes in their own interventions. The Regional Energy Bureaus have adopted EnDev developed training manuals and modules to support the establishment of ICS and solar PV businesses. Several local and international NGOs (e.g. the Italian COOPI, ADRA, UNDP) and other development agencies are also supporting the establishment of mini-grids, solar PV and ICS businesses using EnDev developed modalities. In the four major implementation regions as well as in Gambella, EnDev, through its regional offices, actively participates in the regional government energy steering committees that comprise all development sector bureaus in the regions thereby directly contributing to energy and other sector development issues at the regional levels. EnDev Ethiopia has also supported the Regional Energy Bureaus to digitalize their energy data management and will continue to support them with capacity strengthening in the next phase.

The Adoption of the sustainability framework for electrification of the off grid social institutions and the digital mapping of electrified off grid social institutions shall form a firm basis for sector cooperation and coordination, looping in entities like the WB, which is developing a

USD 400 Million package for off grid electrification (ADELE). This has a potential for replication beyond Ethiopia.

Furthermore, in the promotion of mini-grids, the Regional Energy Bureaus of Amhara, Oromia, Sidama, SNNPR and Tigray are co-financing towards the EnDev support by covering the full cost of electric grid lines. EnDev Ethiopia will further foster this cooperation model in the next programming phase by, for instance, focusing on building the needed human and institutional capacities to ably perform future tender procedures for EPC for grid designs that will be funded directly by the regional governments. With the targeted involvement of local solar and ICS companies in the installation, service, and maintenance of institutional solar PV and institutional cooking systems, EnDev increases these companies' standing in the solar market and promotes their business indirectly through increased installation competence and visibility through promotional and market campaigns. Using the show-case installations for the social institutions, EnDev Ethiopia will advise the government on further rolling out its own social infrastructure access to electricity and cooking energy solutions, especially regarding quality criteria, sustainability and private sector involvement. In addition, EnDev Ethiopia also aspires to leverage additional co-financing from non-EnDev donors in Ethiopia such as Irish Aid, the SIDA and the EU to further promote access to energy and sector support. EnDev Ethiopia will continue the cooperation with the Development Bank of Ethiopia (DBE) that is managing a WB's credit facility focusing on off-grid electrification and clean cooking solutions. DBE will also manage the EnDev COVID-19 impact response development assistance fund – a grant package to provide relief measures to the EnDev partner renewable energy enterprises to mitigate the negative effects of the ongoing pandemic. The programme will in addition collaborate closely with UNHCR, ARRA and other several NGOs in the humanitarian sector in Ethiopia to create local solutions for access to electrification (solar PV solutions), clean cooking energy and alternative fuels for refugees and host communities.

### **Nexuses**

Through the promotion of access to electricity and cooking energy for households, social institutions, and productive use businesses, EnDev Ethiopia also works at the nexus of the health, education and rural economic development sectors with further enhanced focus on the nexus with the agriculture sector. In the health and education sectors, for example, EnDev Ethiopia will work closely together with the concerned departments of the Ethiopian Ministry of Health and Ministry of Education on improving and sustaining their respective electrification projects. Weaving such energy nexus topics into EnDev Ethiopia's components will be at the core of our activities.

As Ethiopia is one of the source countries for migration, the Programme will continue closely collaborating with UNHCR, ARRA and various other GIZ projects (Energy Solutions for Displacement Settings, ESDS; Qualifications and Employment Perspectives for Refugees and Host Communities in Ethiopia Programme, QEP; global programme Better Migration Management, BMM and the Cross-Border Collaboration Programme) to create local solutions for access to energy as a means of reducing rural migration to cities, and outside the country. This will be addressed by first carrying out an analysis of the extent of the migration problem, and what effects it has on rural economies and detail the measures access to energy could

play a role. EnDev Ethiopia will then address some of the low-hanging fruits, with a strong focus on gender and youth.

## ULAB Recycling

### Sector alignment

The planned battery-recycling initiative is in line with the Environmental Policy of Ethiopia (1997) as well as recent major legislations in Ethiopia: The Regulation on the Management and Disposal of Electrical and Electronic Waste (2018), and the Hazardous Waste Proclamation (2018). The project will further feed the outcomes into the Energy Development Partner Working Group, of which EnDev Ethiopia is an active member. Through planned sector dialogues, the project will invite and engage the key players to consider the multisectoral nature of the ULAB-related intervention. These players include the MoWIE and development partners such as World Bank, European Union, Irish Aid, UNEP who all finance and implement extensive solar PV electrification projects based on lead-acid batteries. The plans and outcomes of this project will also be reflected in the dialogue with the EFCCC, that plays a key role in environmental regulation and enforcement. In addition, EnDev Ethiopia will continue to play a key role in strengthening the EFCCC-led ULAB partners working group that brings together all the development partners supporting this sector in Ethiopia.

### Implementer base

The World Bank plans to engage in the improved collection of ULAB via the introduction of subsidies. However, their approach is mainly from the perspective of job creation not improving the lifecycle management of lead acid batteries. EnDev Ethiopia will therefore ensure synergies with the World Bank to ensure a holistic approach and find joint areas of collaboration. This will be done in close coordination with MoWIE and EFCCC. EnDev Ethiopia has also engaged strong international consultancies such as Öko Institut Freiburg (Germany), as well as national consultants for technically supporting the implementation of activities. Synergies with other global agencies working on lead acid batteries is being facilitated. Furthermore, development partners in the sectors such as the World Bank, European Union, UNEP, etc will be approached for providing additional technical and/or financial support, networking assistance and political backing for the planned project as well as for any up-scaling activities. The private sector will continue to play a key role in the implementation of the project, first and foremost through the upgrade of their ULAB recycling facilities and ULAB collection. Hence, cooperation with individual companies as well as with relevant private sector associations and potential investors will be developed and supported during implementation. The project will further cooperate with research and academic institutions that have already voiced their interest in contributing to the technical advisory on e-waste / hazardous waste management and labour safety.

### Leverage / spin off

Given the aforementioned starting conditions, the project has a pilot character, aiming at laying the ground for moving the currently present lead-acid-battery recycling market into a new direction for improving other forms of e-waste. EnDev Ethiopia will leverage the proposed interventions with additional funding from other development partners such as the European Union, Irish Aid and potentially also SIDA, for either supporting the pilot or contributing to any up-scaling activities.



## **Nexus**

The project aims at creating synergies and collaborations with environmental and medical research facilities, who are supposed to work in this area. These facilities are already in parts identified, and comprise the Kotebe Metropolitan University of Addis Ababa, the Addis Ababa Science and Technology University as well as the environmental research NGO PAN-Ethiopia. Collaboration is already ongoing with NGO PAN-Ethiopia.

### **1.7.5 Modalities**

#### **Approach**

Given the main intention of the programme to provide energy access and support the transformation of the energy sector at scale, EnDev Ethiopia in partnership with MoWIE and the Regional Energy Bureaus, will focus on enhancing the enabling environment for market development and government-driven initiatives and policies, put particular attention on energy and related financing systems development and close alignment and coordination with other development partners' efforts.

In addition, the project will further enhance its active normative role in the steering and coordination structures such as the Energy Development Partner Group, the regional government's Energy Sector Steering committees, as well as the National Clean Cooking Alliance, the CDM Coordination platform, the Energy and Environment Working Group for the humanitarian (displacement and refugee) settings, and the EFCCC ULAB development partner group, feeding-in the experiences and knowledge generated on the ground to create synergies with sector development efforts.

Specifically, at programme component level:

The **Mini-grid component** will aim at supporting the mini-grid sector in Ethiopia to develop, construct, operate, manage and maintain a sustainable minimum of tier 3 electricity supply in rural areas. It is expected that tier 3 can be achieved through a well guided EPC (or similar) processes. In combination with the previous EnDev Ethiopia MHP mini-grids that focussed mainly on experimenting in the mini-grids space and trialling the cooperative model in Ethiopia, the programme will make use of the triggered 8 new solar mini-grids to jump-start the regulatory, financial and technical capacity to rise up to a professional level capable of servicing the demand for increased number of mini-grids in Ethiopia and the region.

EnDev's interventions would aim at driving the sector support to upscale the cooperative mini-grid model. This will entail a sector transformation defining roles and responsibilities in an institutional landscape for transparent procedures for applications from buyers, and payment of subsidies from the government to the private sector's implementation of EPC of mini-grids.

Spatial planning for better decision making based on facts will identify mini-grids as key into the national electrification planning and reform process and enable EnDev to contribute to putting in place a cornerstone in Ethiopia's future energy planning.

Though the financial systems for subsidies will have to be developed together with partners like the World Bank and African Development Bank, there will also be a need to include the private financial sector to i.e. loan for hardware as collateral. EnDev's current position in the donor coordination group is perfect for this. The current regional governments participation in the mini-grid discussion space would need to be strengthened, both for developing of productive use of energy, and improving institutional services and boost comprehensive rural development.

### **Solar Electrification and Market Development component**

In the **solar market development**, the component will closely partner with the solar industry associations in the areas of promotion campaigns and capacity building to increase and mobilise public uptake and decision makers focus on solar PV. The close institutional capacity development support, the coaching and continued partnership provided by a European solar association consortium shall develop the capacities of the industry associations to partner with EnDev Ethiopia and other partners for policy level dialogues and lobbying but also as a vehicle for provision of marketing and capacity development support to the private sector. Our capacity development support to the private sector will be comprehensive and channelled mainly through this sector's industry association focussing not only on technical due diligence but also on business planning and development, and further enhanced by mainly using and supporting existing institutionalized training facilities.

EnDev Ethiopia will mainly focus on working with the 20% (currently about 24) relatively high performing solar enterprises through facilitation of access to finance and focussed/ customised technical support. This will enable the best performing solar PV enterprises to take an increasingly bigger share of the market and displacing the currently prevailing bad quality of it. Together with its financial systems development (FSD) parallel stream, both components facilitate customised credit or loan packages for companies and for the expansion of PAYGo services.

In enhancing the installation of **Solar PV systems for social institutions**, the approaches focus on supporting the public and private solar PV sector of Ethiopia in planning, implementing and sustaining solar PV electrification of social facilities. This entails providing a mix of different capacity development measures on different actor-levels, ranging from leveraging an additional support for the installation of 12 new solar PV systems as showcases, up to trainings and technical advice on system design and due diligence for private sector and government partners. The programme will work towards ensuring greater involvement, ownership of and coordination between line ministries in the energy, health and education sectors to ensure sustainable management. This is expected to also feed into the government's National Electrification Programme (NEP 2.0) to establish standardized processes for public management of energy systems of social institutions. The approach will hence shift to technical, policy and sector advice to the government entities and the private sector. Emphasis will be placed on developing an innovative and holistic sustainability framework that takes into consideration past experiences thereby improving overall market development of the energy sector

Reason for suggested approach: This approach is adopted as the solar market in Ethiopia is flooded with bad quality sub-standard products and constrained by policy and regulatory

issues. A well-organized industry association is an essential partner in the governance of the sector, is able to influence policy and regulatory aspects and as well enforce quality standards and sound business practices. It provides the required partner on the ground for international players in the solar sector to access the market and forge partnerships with the local private sector thereby bringing the desired foreign currency access and scale in the market.

While the Ethiopian government has expanded on solar electrification projects for social facilities, sustainability issues have remained a challenge in the sector due to a lack of understanding and proper planning for operation and maintenance of the systems. EnDev Ethiopia with over 10 years' experience in the field has the expertise needed to build local capacity of public and private sector actors in the quality design, operation and maintenance of projects while also providing policy and regulatory advice.

### ULAB Recycling

The battery-recycling intervention uses a mixture of facilitating access to financial to ease CAPEX-burdens, as well as providing non-financial capacity development measures such as awareness raising on the hazardous effects of lead-acid, training, technical advice and policy/ regulatory advice. Along the three lines of regulation- a) development & enforcement, b) private sector support and c) certification development, the intended capacity development is foreseen to take place at the individual, organisational, political framework and society level. The project will as well make use of the financial systems development component of EnDev Ethiopia to facilitate customised credit or loan packages for the targeted companies. Support will be provided to ULAB recycling facilities to plan upgrades in phases starting with low hanging fruits including capacity building for staff and facilitating access to finance for upgrades

Reason for suggested approach: Following an in-depth analysis on the ground, a differentiated multi-level capacity development strategy is needed in order to curb and divert the current development trend of a highly complex but environmentally unsound and widely unregulated battery recycling value chain. In this situation, concentration on only one stakeholder group and/or with only one capacity development tool (financial, non-financial, trainings etc.) will not yield the expected outputs in the long run.

For example, concentrating solely on strengthening the regulation enforcement side, given the powerful legislation in place, will end up with closing down practically all major ULAB recycling facilities as there are no state-of-the-art ULAB treatment facilities existing in Ethiopia to date, and given the required, but technologically complex and capital-intense upgrading measures, it would take a long time until the major ULAB recycling facilities reach the needed compliance level on their own. On the other hand if focus is given only for supporting the private sector in technically upgrading their facilities and no regulatory mechanisms are put in place to penalise the unqualified businesses, the qualified will be expensive for the market and go bankrupt.

Next steps would be to replicate similar approaches to lithium-ion and other forms of e-waste.

**Cooking Energy component** will continue to closely partner with the ICS industry associations in the areas of promotion campaigns and capacity building to increase and mobilise public uptake and decision makers focus on clean cooking. EnDev Ethiopia will focus on working with the 20% (currently about 31) relatively high performing ICS producers out of the programme supported ones and carefully selected semi-industrial ICS producers through provision of financial incentives such as RBF and technical support. This will allow EnDev Ethiopia to lift the best performing producers to a higher level. The capacity development support will be comprehensive focussing not only on technical due diligence but also on business planning and development, and further enhanced by mainly using and supporting existing institutionalized training facilities. Continued collaboration is also foreseen with SNV with respect to activities in the creation and fostering of a conducive environment in the ICS and CCS sectors, strengthening of the national platform to advocate for the sector at ministerial, political and other decision-making levels.

The aforementioned multi-level capacity development and policy advisory approach was chosen because of its cost-benefit ratio, the long-term market development benefits and sector growth expected from the component's interventions. The chosen mix of policy advisory services, sector coordination, association development, private sector trainings/ capacity development, material support, financial sector advisory services, and RBF incentives delivers a comprehensive package - an investment that leads to transformational impacts that will allow the energy sector to grow exponentially. The project will as well make use of the EnDev Ethiopia's financial systems development (FSD) component to develop customised credit or loan packages for the companies. Through the FSD component, EnDev Ethiopia will provide technical advice to financial institutions on the creation of a mobile-money-based PAYGO structure as well as technical advice to policy makers on lifting market entry barriers for large international PAYGO service providers. The project will nurture the emerging political will to open up the market for international players by highlighting the high quality skill transfer, the additional job creation directly through the expansion of the PAYGO services and as well the productive use of energy that PAYGO offers. This is expected to create the preconditions for PAYGO, and the work with MFIs to develop financing products for end-users and working capital credit lines for ICS companies. At present, EnDev is promoting: 1) Mirt (Classica and Slim), 2) Mirt with Chimney (Slim and Classical), 3) Tikikil (with wood and multifuel), 4) IRS, 5) Gonzie .The assessment on cooking technologies and their rankings on efficiency and life span will inform the component's decision on which ICS to be promoted using this approach.

**Financial Systems Development component** will focus on providing tailored advisory and service packages on financial systems/ enabling environment issues that are currently holding back the growth of the energy sub-sectors. The component will be fully outsourced as a consultancy to an experienced company (or consortium) with expertise in the financing-energy-access space. The central approach of the financial systems development component will be collaborative, i.e. to leverage financial sector activities of other financial institutions such as AfDB and WB to achieve greater impact in the EnDev Ethiopia supported sub-sectors.

EnDev Ethiopia has a chosen mix of policy advisory services, sector coordination, association development, private sector trainings/ capacity development, material support, financial sector advisory services, and RBF incentives delivering a comprehensive package.

## Activities

The programme foresees the following activities under each of its components:

### Mini-grids:

#### Supply side

- Ethiopian companies in the sector will be targeted to partner up with international companies to increase their capacities, learn by doing, and transfer know-how to deliver on all aspects on Engineering (develop and design a mini-grid), Procurement (import equipment from factories to an attractive price), and Construction of the mini-grids as stated in the mini-grid directive. Prices for a mini-grid would need to meet international market prices.
- Other companies will be targeted to take up the role as the buyer's engineer on site (and follow international contractual procedures), to report back on the development and to supervise the buyer. Further, the engineer will perform test and commissioning and prepare hand-over documents securing that the quality is met and that a set warranty period can start.
- Mini-grid cooperatives' Operation, Management and Maintenance staff will receive capacity building for successful and economically sustainable electricity supply.
- 3<sup>rd</sup> party maintenance companies will be identified and contracted to implement regular maintenance and specialized maintenance operations on the mini-grids (3<sup>rd</sup> party company would need an insurance to cover up for damages to secure operation).
- Due diligence between 3<sup>rd</sup> party maintenance companies and the insurance sector to increase understanding of the mini-grid sector and to draw up insurance policies.
- Training gaps in the private sector should mainly be handled by the private sector itself. However, if this is not possible, the need for a more structured apprenticeship to become a solar technician should be investigated with the solar association.

#### Demand side

- Assessment and promotion of Productive use of Energy to increase the revenue from electricity sale to pay for the operational costs.
- Technical Assistance to adopt the EPC model for mini-grids (mainly Micro Hydro Power and Solar power)
- Development of business plans for sustainable cooperative owned electricity supply (cost reflective tariffs)

#### Enabling environment

- Develop the cooperative model and its adoption into policy and framework (including cooperative law, the mini-grid directive etc.). Also ensure that issues of re-settlement within supply areas, land rights, legal disputes, etc are addressed in the policies.
- The cooperative framework should be strengthened to obtain a legal standing and eligibility to access financing for building, expanding and owning mini-grids.
- Include the cooperative mini-grid model as a vital avenue for off grid electrification in the NEP 2.0 implementation.

- Implement gender mainstreaming and energy justice. Gender balance among OMM staff, making sure that electricity provision supports women's safety, increase knowledge and improve livelihood. Priority to women developing Productive use of energy, etc.
- Roles and responsibilities in the enabling framework should be clearly defined and developed (especially financial system development linking mini-grid buyers with subsidies from the GoE, WB, AfDB etc, spatial planning, adoption into NEP, and decision power between federal and regional governments). The possibility to facilitate Public Private Partnerships, PPP, in collaboration with other GIZ programmes should also be explored.
- Ensure that the various MoWIE agencies (EEA, EEU) as well as the Federal Cooperative Agency (FCA), will be further capacitated to integrate and develop complimentary policies. This might require a broader exchange among the major agencies as well as the regional structures. To allow for a sustained private sector growth and investment, there is need to ensure that there is a systematic dialogue process between the government entities and the private sector in the mini-grid space.
- Roles and responsibilities in the cooperative framework should be clearly defined and developed (giving the cooperative tools to manage a sustainable electricity supply with clear regulation for customers' and cooperatives' rights and duties)

### **Solar Electrification and Market Development component:**

#### Demand side

- EnDev will work with the industry associations, the government and other partners in extensive promotion and awareness raising campaigns to promote solar energy
- EnDev Ethiopia will introduce a well-researched RBF for solar in the context of promoting productive use of energy, targeted at the importer/wholesaler level (cf. EnDev Benin) to focus on larger players and use EnDev's project resources efficiently and tapping partners' resources, such as of World Bank and AfDB.
- Capacity development support shall be provided for both central and local government sector partners, and other stakeholders (e.g. humanitarian space) on planning, implementing and ensuring sustainability of the installed systems. This is in addition to installations from governments' own electrification projects ensuring sustainability and scaling up (incl. refugees and host communities).
- Focus on the installation, service and maintenance of pilot solar PV systems with all required sustainability features and digital monitoring of selected institutions. Continued capacity building measures to build trust in the sustainability of the systems.

#### Supply side

- In the solar PV off-grid sector, EnDev will work with regional and international PAYGO companies to facilitate market entry in Ethiopia by supporting removal of market barriers and offering advisory packages (seminars and workshops).
- In the existing national off-grid solar PV market, EnDev will identify new supply chain actors to improve the delivery of solar systems in rural areas and support existing actors to reach new market areas (including displacement settings), providing contacts in local authorities.



### Enabling Environment

- In cooperation and coordination with partners (such as WB, AfDB and UK-Aid) who are active in the financial systems development space, identified market barriers will be systematically targeted, for instance by engaging with the financial sector to create the pre-conditions for PAYGO business models.
- Moreover, EnDev Ethiopia will continue to strengthen the solar industry associations to have the needed capacities as an industry voice to advocate for removal of enabling environment barriers that are holding back the growth of the sector, such as stringent solar import requirements.
- In close collaboration with the Financial Systems Development component, financial support and loans for solar companies will be leveraged.
  - Together with the introduced digital mapping of electrified social institutions in Ethiopia, the project supports the public partners to setup and manage a robust digital monitoring system for the solar PV social installations.
  - Put in place structured dialogue and regional / international expert exchange visits to embed standalone institutional solar systems in government strategies and to highlight the significance of the NEP 2.0, EnDev Ethiopia will pursue the development of a framework for adoption of solar thermal applications for social institutions (such as solar cooking and solar water heating) and other energy efficiency measures/ appliances/ technologies.
  - In addition, the component will address market barriers for solar wholesalers and retailers,
  - Providing TA to policy makers on lifting stringent solar component import requirements and market entry barriers for larger international solar companies.

### **ULAB Recycling:**

#### Enabling Environment

- The project will continue to provide EFCCC with all-round technical assistance support, as the major implementation partner for ULAB recycling and the Ethiopian agency with the regulatory mandate for e-waste handling.
- This will include an embedded EnDev seconded advisor to EFCCC to facilitate the implementation of the **Roadmap for End-of-Life Management of LAB**, as well as the Public Sector Stakeholder coordination structure/ processes and awareness creation/ promotional measures.
- To bring about a transformative impact in the sector, EnDev shall facilitate enhanced capacity development support for government actors in effectively regulating ULAB-management in Ethiopia and for the private sector actors in complying with Ethiopian regulations relevant to ULAB management through active participation in the standardization of technologies and processes as well as the licencing scheme.
- Together with EnDev Ethiopia's Financial Systems Development component, EnDev shall facilitate regulatory provisions and access to finance for the private sector to expedite the reinsertion of ULAB into a sound recycling scheme.
- The project will also facilitate, in cooperation with other stakeholders, the development and implementation of a framework for sound handling of other battery types and e-waste (e.g. dry cell, lithium-ion, solar PV modules etc.).



## Cooking Energy component

### Demand side

- All activities will be coupled with extensive and innovative awareness and promotion campaigns, in particular Behavioural Change and Communication (BCC) and mindset change on promotion of ICS and CC solutions. This will include enhanced marketing and promotional campaigns to respond to growing demand for ICS, e-cooking and other CC technologies among individual users in target regions and social institutions and
- Facilitate consumer financing and incentives in cooperation with the financial systems development component

### Supply side

- Support the identification and transformation of producers into semi-industrial production levels through expansion and mechanisation of production at scale for ICS, e-cooking and other CC technologies and alternative fuels.
- A well-researched tool such as RBF will be used in larger scale that will contribute to the enhanced access to ICS products and alternative cleaner fuels.

### Enabling Environment

- A key transformational change that is key for achieving the overall target in the clean cooking sector is the existence of a coordinated collaboration among stakeholders which is channelled through a responsible body such as ECCA. As a result of this coordination, there will be room for working on policies, frameworks, regulation and their implementation to ensure the existence of an enabling environment to scale up the clean cooking sector efforts.
- The component will focus on institutionalizing trainings in the ICS sector and offer a range of support to existing institutions by providing standardized trainings/ capacity development. This will contribute largely to a sustained increase in quality skilled manpower and quality product supply. This will in turn address the current production capacity of producers (both in quality as well as production at scale) that will be coupled with facilitating access to financial schemes to effect mass production leading to scale.
- Continue to partner with SNV in broadening the results of its current successful intervention under the project "Support to Enabling Environment for the Clean Cooking Sector in Ethiopia II".
- All activities will be coupled with extensive and innovative awareness and promotion campaigns, in particular Behavioural Change and Communication (BCC) and mindset change on promotion of ICS and CC solutions.
- In addition, the component will expand the cooperation with UNHCR, ARRA and other partners to develop markets of ICS technologies and alternative fuels in the humanitarian settings.

## Financial Systems Development component:

### Demand side

- Development of SMEs as energy off-takers and financial development of the communities will be supported with technical assistance of and links to MFIs.
- Work with MFIs to develop inclusive financing products for end-users and capital credit lines for solar and ICS companies

### Supply side

- technical support will be provided to local financial institutions to develop financial products for the energy sector in Ethiopia.
- Through this component, EnDev Ethiopia will provide technical advice to financial institutions on the creation of a mobile-money-based PAYGO structure

### Enabling environment

- Technical advice to policy makers on lifting market entry barriers for large international PAYGO service providers. This is expected to create the preconditions for PAYGO,
- Further support the development and provision of working capital loans for solar companies to reach out to rural areas.
- Since access to foreign currency still remains a major challenge for the energy sector, EnDev Ethiopia will work closely with various stakeholders to overcome this bottleneck in a sustainable manner.

## 1.7.6 Results

### Access Targets

Project results	Targets*	Outcome level Indicator	Sources
People: Access to Electricity	1,160,869	Indicator 1: Energy access for households	Collection of sales and installation data for products / technology / service; baseline data on household size and direct survey of beneficiaries.
People: Access to Cooking	635,297	Indicator 1: Energy access for households	Collection of sales and installation data for products / technology / service; baseline data on household size and direct survey of beneficiaries.
SI: Access to Electricity	409	Indicator 2: Energy access for social infrastructure	Collection of sales and installation data for products / technology / service; direct survey of customers and beneficiaries. (Verification system)
SI: Access to Cooking	867	Indicator 2: Energy access for social infrastructure	Collection of sales and installation data for products / technology / service; direct survey of customers and beneficiaries. (Verification system)
PU: Access to Electricity	701	Indicator 3: Energy access for MSMEs	Collection of sales and installation data for products / technology / service; direct survey of customers and beneficiaries. (Verification system)
PU: Access to Cooking	1,472	Indicator 3: Energy access for MSMEs	Collection of sales and installation data for products / technology / service; direct survey of customers and beneficiaries. (Verification system)

### Further breakdown summary of output Targets

Project Results	Targets	Target dimension
Private Sector: Supply	5 semi industrial ICS companies	Producing to scale to meet increasing demand for high quality ICS technologies
Private Sector: Supply	10 sheds constructed for ICS production	Producing to scale to meet increasing demand for ICS technologies and CC solutions in displacement settings
Private Sector: Supply	5 briquetting plants	Access to alternative fuels increased at regional level and in displacement settings

Private Sector: Development	6 solar mini-grids	a direct implementation through EU financing
Private Sector: Development	2 solar mini-grids	a direct implementation through EnDev core Budget
Private Sector: Development	10 mini-grids	Indirectly through support to development/ government partners
Private Sector: Development	224 new productive use businesses	will be fostered through mini-grids
Private Sector: Development	10 solar PV social institutions	models of sustainable and smart social installations introducing digital solutions (upgrading or modification of existing systems)
Private Sector: Development	12 new showcases solar PV systems for institutions	through support to development/ government partners (eg WB ADELE, Ministry of Health)
Private Sector: Development	2 ULAB recycling facilities supported to upgrade	in cooperation with development/ government partners
Private Sector: Development	2 ULAB collection companies supported to upgrade	in cooperation with development/ government partners
Private Sector: Development	4 international solar PV companies to enter the Ethiopian market	In collaboration with other international partners
Private Sector: Development	at least 5 large local solar PV companies to be identified and supported	Facilitation through twinning with the supported international companies

\*These are net figures based on initial rough estimates. Quantitative results from the policy and sector support in the various components as well as the financial systems development are mentioned in narrative form. The impacts of policy and financial systems will materialise only in the last 1-2 years of implementation.

### **Description of expected results of the project in terms of outcomes**

Given the emphasis on support for policy changes, regulatory reforms, capacity building across the board, which will have impacts on the market beyond what EnDev Ethiopia measures from its direct interventions in the market, we are in the process of developing a

monitoring and evaluation mechanism to estimate the impacts of our intervention in the realm of enabling environment and how much of it can be attributed to EnDev in quantitative terms.

### Mini-grids component:

**Expected results:** Through the ongoing efforts, coupled with an emphasis on sector support and financial systems development, the component aims to trigger additional 8 mini-grids in 4 years from partners (regional and central governments, etc). This is expected to have sufficient ground for regulatory provisions and/or changes that would allow for a ripple effect to build hundreds of the same in the future leading to a number of economic viable mini-grids implemented at normalized cost. To reach to that level, the Ethiopian partner institutions and EnDev Ethiopia will have developed a plan and budget for an eventual mini-grid roll out. This will be built up on the previous and the ongoing mini-grids that are aimed to cement the cooperative model and the existence of a mini-grids market in Ethiopia, hence ensuring that (cooperative) electricity supply is sustainable. It is expected that the interventions will contribute to developing a regional sizeable market to attract private mini-grid providers to compete on the African market for mini-grids that are able to electrify a good fraction of the 35% of Ethiopians without access to electricity in the off-grid space. Furthermore, there will be a new service sector for mini-grids anchored in the rural areas, increasing employment opportunities. SMEs in rural areas will be developed to foster economic development. The service delivery from government institutions as well as health and educational institutions will increase. In total, 5 villages will be electrified through external support, technicians and apprentices will be trained in local workshops, and cooperative models will be upgraded to meet a higher demand for sustainable electricity supply. EnDev Ethiopia will support development of a clear strategy and policy on mini-grids to be in place emphasising on different stakeholder's roles and responsibilities, tariff structure and the linkages between mini-grids and grid compatibilities with the socio-economic situations on the sites.

### Solar Electrification and Market Development component

#### Expected results:

The component will attract and support at least 4 international solar PV companies to enter the Ethiopian market. Identify and support at least 5 large local solar PV companies and develop a twinning with the supported international companies (e.g. through franchise, B2B, etc.). Solar industry associations will be strengthened to mobilize resources to ably manage platforms for policy dialogues and lobbying work to facilitate technical, business support and facilitate access to finance to their members. Through the linkages with the FSD component, working capital loans will be developed and made available for solar companies. Solar associations will be supported to have the needed capability to play a leading role in the promotion and enforcement of quality standards and quality control for solar products and services.

Awareness raising, and trainings will be provided to policy makers that will result in policy lever recognition and adoption of the engagement of international solar companies in the Ethiopian solar sector, mobile-money-based PAYGO structures, improved planning, tendering and implementation processes of government-driven solar electrification initiatives.

Roundtables and fairs will be regularly organized by the solar associations and federal / local government partners coordinating sector stakeholders and the private sector companies.

EnDev Ethiopia will provide material and training support to trigger electrification of additional 12 social institutions installed as per EnDev's developed sustainability framework. This will support the health and education service delivery of these institutions, as they will be enabled to use electrical devices such as lights, laboratory equipment, ICT and teaching appliances. Furthermore, at least three-line ministries as well as the energy, water and education regional bureaus of 5 regions will be capacitated to follow-up on the sustainability of the EnDev supported institutional solar PV systems. This will include to plan, implement and sustain similar interventions, which will replicate the impacts arising directly from the solar installations. Depending on the type and catchment area of the off-grid institutions, it is expected to benefit between 500+ individuals (primary schools) and 17,000+ individuals (health centres) at each social institution. The intervention is further expected to lead to key solar PV components to be increasingly available on the Ethiopian market. EnDev Ethiopia will further support in the strengthening of the standalone section of the governments intended extensive rollout in its National Electrification Programme (NEP 2.0).

### ULAB Recycling:

**Expected results:** at least two major ULAB recycling facilities in Ethiopia and two ULAB collection companies will have invested with the support of the project in improved collection, recycling and waste disposal measures. Furthermore, a licensing scheme in form of a competence certificate for ULAB handling companies will have been developed. This would lead in the mid- and long-term to reduction of lead contamination of the recycling facility's workforce and its surrounding environment according to standards of the International Lead Association (ILA) or a similar international entity.

Spill-over effects of this intervention will contribute to laying the foundation for the technically much more complex and less cost-efficient collection and recycling of dry cells and lithium-ion batteries. The project, however, will focus on the ULAB lifecycle, as this will be the base to develop the first advanced recycling system. This is expected to lead to the following outputs: 1) Improved technologies and technical measures on ULAB collection and recycling in place; 2) access to financial support for ULAB collectors and recycles is enabled; 3) licensing scheme developed; 4) general public and political stakeholders aware and informed, and finally, 5) regulatory agents and inspectors trained on technical standards and guidelines and sound handling of lead acid batteries.

### Cooking Energy component:

**Expected results:** The intervention of this component will create a platform where larger private players in the areas of ICS and CCS are built-up and competition in the market is stimulated. This will move the Ethiopia clean cooking market to a more sophisticated level, featuring a larger quantitative and qualitative range of products and services. The cooking component aims to identify and support at least 5 larger local companies in the cooking energy sector to have more market-oriented business plans and focus production at a semi-industrial level. Targets also include the installation and promotion of at least 5 briquetting plants

(large and small scale) as well as 10 ICS production sheds that will be constructed to support increased, high quality production of ICS and CCS technologies at regional level.

These major results are expected to: 1) Increase the sustenance and strengthening of the national clean cooking alliance; 2) boost institutional strengthening of ICS associations 3) enhance public sector institutional strengthening and sector facilitation; 4) increase access to quality ICS/CCS (certified products) and capacity to meet growing market demand for CC and ICS technologies 5) contribute to mindset and behavioural change of end users to understand and take up higher tier technologies and, 6) achieve sustained impact and accelerated adoption of ICS/CCS.

### **Financial Systems Development component:**

**Expected results:** The component aims to reform the legal and regulatory framework of the financial sector and establish and improve innovative financial schemes to stimulate market development. Specific technical exchange will take place for this purpose hence increasing the capacities of banks and MFIs (public and private) to develop innovative packages for a wider roll-out of energy access. Internally, a major result will be that all the four EnDev Ethiopia components are horizontally supported in financial aspects.

### **1.7.7 Sustainability**

**Mini-grids:** Support to a) the public sector through direct policy level engagement, b) the private sector through direct capacity building at service level and c) institutions through the industry associations, and d) the finance sector, will enhance the institutional and financial sustainability of mini-grids. This is complemented by EnDev Ethiopia's role in the several steering and coordinating platforms. As there are presently relatively high investments (CAPEX) in mini-grids, cooperatives and regional governments will be trained on business plans development in order to consider the billing of users at different levels as a cost reflective tariff. This will ensure a financial sustainability for potential mini-grids financed by regional and central government funds. This will also enable the operators to achieve true costs in the operation of mini-grids (covering OPEX + CAPEX). EnDev Ethiopia ensures due diligence between the service sector (finance and insurance), the technology providers and the mini-grid owners.

**Technological sustainability** will be enhanced through engagement of the private sector capacity in East Africa, as well as a mix of options - MHP, solar and Hybrid. In addition, a variety of SMEs will be larger off-takers of the electricity, ensuring the economic viability (hence sustainability) of the developed mini-grids. EnDev will be introducing a high degree of energy efficiency to keep the number of solar modules and batteries at the lowest level to reduce CAPEX and OPEX, and therefore reduce tariffs to a minimum allowing more marginalized customers to connect and increase living conditions. As part of the energy justice study, the component will analyze the environmental impact (and measures thereof) of mini-grids, in particular on MHP, ensuring ecological and environmental sustainability by "doing no harm".



## Solar Electrification and Market Development

### Financial and Institutional sustainability

The results of the promotion of solar PV for social institutions, commercial use and for household electrification will be fostered and ensured by the extensive awareness raising and technical support that will be rendered to local, regional and national governments, private sector players, other local actors and the society at large. The improved sector governance induced by the sector coordination and the organized voice of the industry as well as the solid technical ground put in place through the cooperation and support to TVET and higher learning institutions to provide technical trainings and backstopping, will impact for a self-sustained solar PV sector. In addition, the flourishing of financing mechanisms with simplified and customized loan schemes by selected financing institutions will continue to benefit both the demand and supply side as a backbone for market development. The promotion of PAYGo hand in hand with the financial solutions will also promote access thereby promoting financial sustainability of the market.

In order to enhance the financial sustainability of the EnDev-led (as well as government-driven) solar electrification of social institutions, EnDev Ethiopia will focus on advising the regional partners on the proper service and maintenance of these systems including component replacement. This entails developing and supporting the implementation of a sustainability framework for solar PV electrification of social institutions. This is because health and education are both sectors that currently have long-term government and donor-commitments for essential services especially in rural areas. With the needed knowledge, extensive solar PV electrification operation, maintenance and repair of their respective social institutions is ensured to be financed accordingly. The programme will invest in training local installers as well as local companies (private sector) as possible service and products suppliers that the government can tap into. This will be done in close connection with government counterparts and the established solar associations as a contribution to institutional sustainability.

### Technical sustainability

Technical sustainability will be further ensured by the training of solar PV technicians and companies in the installation, service and maintenance of the systems. These trainings will enable the companies to follow up on the installation including replacement of components with similar or even more advanced ones in the future. In addition, as pico-PV and plug and play systems require minimum maintenance, overall awareness creation measures that will be undertaken shall enhance the understanding of the consumers about proper use and care required for the solar PV products *further enhancing the sustainability of the technologies*.

Quality issues and lack of availability of large quantities remain challenges the programme shall be addressing through stimulating the demand-side for quality and quantities and providing support enhancing the enabling environment for lowering financial and market barriers for solar PV importers.

**Ecological sustainability** the expedited and wide dissemination of solar PV solutions with the adoption of the longer-lasting and more environmentally friendly Lithium-Iron-Phosphate batteries instead of the environmentally hazardous lead-acid-batteries as well as improving the lifecycle management of lead acid batteries which is still the popular battery type and



accompanied by measures with e-waste management will offset the use of polluting fossil fuels contributing to the environmental protection and ecological sustainability.

Setting the foundation for E-waste of solar PV components and installation material will remain a problem to solve and is in parts to be tackled by the Battery Recycling activity regarding the promotion of an environmentally sound battery lifecycle in Ethiopia.

### **Social sustainability**

The access to electricity at household level opens up opportunities for inclusive and extensive socio-economic transformation by bringing access to information and possibilities for productive use activities. This further enhances the family's/ individual's wellbeing promoting the demand and appreciation of the solar PV solutions, hence fostering social sustainability of the interventions.

Ensuring the social sustainability of institutional solar PV electrification is generally less challenging, as health posts, health centres and schools are often the first and only social service delivery points in remote rural areas. Hence, any improvement of the social service delivery is usually embraced by the local and neighboring communities as beneficiaries. The selection of social institutions is a joint exercise involving local and regional governments, thus rendering it socially more acceptable. Handovers of the systems to the concerned entities and end user trainings are conducted to ensure ownership and sustainability of the project with periodic and proactive monitoring of projects to be pursued.

### **ULAB Recycling:**

The project will work as a catalyzer for the development of an environmentally sound battery recycling market, which will have indirect implications on the *financial sustainability*. The proposed support measures will be of a triggering character, time-bound and limited, mostly aiming at reducing the initial investment risk for ULAB recycling companies that are willing to become compliant with environmental legislation. The CAPEX-subsidy is further going to enhance the financial flexibility of the supported companies, enabling them to bid higher prices for bulk ULAB on the market, and hence sustain their businesses. Through this, as well as through the licensing scheme that implies preferential treatment for compliant businesses, the investments are to be sustained in the long-run.

**The institutional sustainability** will be assured by the commitment of the government partners (EFCCC and MoWIE) who already have developed a strong e-waste legislation and have declared their strong interest and motivation to continue the implementation of these regulations on their own once enforcement capacities have been built up with the help of the project. In addition, all ToRs, reports and other documents for the project are developed together with the main partner (EFCCC) hence building capacity on the job and securing the need long-term sustainability of the project. In addition, with support of EnDev Ethiopia, EFCCC has initiated a ULAB recycling partner working group that is led by EFCCC and actively attended by MoWIE and development partners. *The technological sustainability* is fostered through linkages the project creates between ULAB recycling companies and waste management equipment suppliers. Technical user trainings are to be included in the supply and install contracts for such equipment. Moreover, the push- and pull-factors for the ULAB recycling industry are going to stimulate maintenance, if not modernization, of the technical equipment in order to continue benefitting from the compliance benefits. Phase out of lead-

acid batteries in the mid- to long term is foreseen through the active promotion of more efficient and reliable battery technology such as lithium-ion.

**The social sustainability** will be ensured by carrying out various well targeted public awareness campaigns on battery recycling. The increase of public awareness on the issue of hazardous lead-acid-battery recycling is expected to mobilize public support for eliminating bad practices as it has immediate impacts on the health of nearby communities.

**Ecological sustainability** is being inherently promoted by this activity as it seeks to reduce, if not eliminate, environmentally hazardous recycling practices that would otherwise result in waste of resources and long-term contamination of the environment.

### Cooking Energy component:

#### Financial and Institutional Sustainability

The financial and institutional sustainability of the project is fostered and ensured by market success, awareness raising of end-users and technical advice that will be availed to local, regional and national governments, private sector as well as other local actors. The improved sector governance induced by the sector coordination and the organized voice of the industry will impact on a self-sustained ICS and CCS sector. In addition, the flourishing of financing mechanisms with simplified and customized loan schemes by selected financing institutions will continue to benefit both the demand and supply side as a backbone for market development.

#### Technological Sustainability

This will be ensured by the training of ICS companies (industry) on the delivery of standard products as well as services and maintenance (as required). These trainings will enable the companies to follow up on the installation including replacement of components by similar ones or even more advanced ones in the future. In addition, the flourishing of financing mechanisms with simplified and customized loan schemes by selected financing institutions will continue to benefit both the demand and supply side as a backbone for market development. Establishment of ICS semi industrial production level companies and attracting large ICS companies will address the limitation in the supply side including the topic of warranty/service and maintenance. Finally, the focus on supporting training institutions and provision of testing facilities using acknowledged national standardized curricula will ensure continued feeding of the sector with qualified manpower.

#### Ecological Sustainability

The project aims to mitigate the harm caused by conventional cooking using unsustainable raw materials – through the ICS/CCS, biomass and other interventions, the component contributes to the reduction of environmental effects of forest degradation, inefficient charcoal production and burning and sale of firewood.

#### Social Sustainability

The component is well appreciated and aims to avoid creating any inequality or social tension by engaging all stakeholders from public and private sector, inclusion of men, women and youth, engagement of private sector to strengthen capacity and business development. The component will ensure to complement all interventions with key messages on benefits of

technologies from a financial and social perspective. Through promotional campaigns and other activities such as focus group discussions (FGDs) to gather end-user's perspectives, it is expected that targeted communities will undergo the behavioral and mindset change and transition to high tier technologies in the clean cooking sector.

### **Financial Systems Development component**

The sustainability of the results achieved by this component lies on an in-depth and hands-on institutional capacity building in the financial sector, as well as firmly embedding our "on-the-ground" experiences and customer base into the functioning of the local financial institutions. In addition, the component aims to reform the legal and regulatory frameworks of the financial sector and strives to facilitate the introduction and constant improvement of innovative financial schemes to trigger and constantly propel market development. Specific technical exchanges will take place for this purpose hence increasing the capacities of MFIs, institutions (public and private) to develop innovative packages for energy access for a wider roll-out, hence sustainable.

### **Exit and handover strategy**

#### **Mini-grids**

The exit strategy for mini-grids involves the support of the development of a strong framework and policy to secure sustainable and fast roll out of hundreds of mini-grids. Supervised by the regional governments and the Federal Cooperative Agency (FCA), the cooperatives will receive the delegated responsibility to operate, manage and maintain the mini-grids. In the proposed phase, EnDev will further consolidate the proof-of-concept for community owned and managed mini-grids. As a lead agency in the (MHP, solar PV) mini-grid sector, EnDev Ethiopia shall advise the policy formulation for nationwide roll out of this model in conjunction with the government's current endeavor to promote mini-grids in off-grid areas. EnDev Ethiopia shall further strengthen the (local) private sector's technical capacities and enhance linkages to international actors for service provisions to the community owned and managed mini-grids. Contrary to the operators who own the mini-grid, private companies can be held economically responsible for system malfunctions and damages and are also able to undertake repairs and restart electricity supply. Business plans will be designed to cover all OPEX and regular maintenance including a buffer for unforeseen expenses that would also contribute to covering CAPEX costs through self-financing of the mini-grids.

#### **Solar Electrification and Market Development**

Enhanced sector support in the form of policy advice to the public partners, technical support for the solar PV industry associations, the focused support to the finance sector and the robust linkage of the local solar market to the international market by the integration of international players in the industry, fostered with the introduction of different business models that digitally include deep rural off grid settings, shall create a local institutional frame work to continue the sector expansion with diminishing donor support. Parallel to this process, the overall awareness created for good quality products in the solar PV sector through innovative campaigns and marketing measures supported by the project in cooperation with the other stakeholders in the country shall establish the required civic society check on the

market place. In addition, a strong financial sector ready to support a stable and flourishing solar PV private sector sets a base for exit.

In the case of electrification of social institutions, capacity development to own and manage institutional solar PV installations in the health, education and agriculture sectors shall be further consolidated in cooperation with the energy sector. Line ministries and regional bureaux shall be supported in mainstreaming energy measures in their personnel structures and budget cycles. To also strengthen the supply-side's capacities, EnDev Ethiopia will continue cooperating with key vocational training centres, ADRA, the Green Peoples' Energy project, the GIZ education sector programme (STEP), Ethiopia Water Technology Institute and other stakeholders working the TVET sector. The programme shall enable the solar PV sector SMEs to access continued technical support from other programmes and institutions. Next to ensuring the sustainability of the installed systems, the government partners will also be capacitated to be able to replicate similar initiatives but in a more effective and sustainable way.

### ULAB Recycling

as EnDev's ULAB recycling project is a pilot in a relatively unregulated and underdeveloped ULAB recycling setting, the baseline for improvement of these conditions is zero. Realistically seen, the planned set of measures including facilitating CAPEX-subsidies will rather help the ULAB recycling sector to orient itself in a new direction and set the ground for first changes that are to be sustained. According to estimations from the Öko Institute in Freiburg, Germany, the complete refurbishment of the three-existing major ULAB recycling facilities in Ethiopia will take several years. Unless some radical or disruptive events occur (such as the emergence of international recycling companies in the Ethiopian market), it is not probable that the implemented technical changes and training measures for regulators will lead to a complete turnaround of the whole ULAB sector and spark an automatic replication of the measures taken.

At least on a long-term perspective, however, the prospects to phase out and handover to the public and private sector will be ensured through the catalyzing character of the project intention. This is also coupled with the environmental regulation enforcement capacities expected to reach a significantly higher level of expertise and effectiveness, hence shutting down non-compliant businesses while forcing the industry to undertake comprehensive upgrading. Once environmental regulation enforcement is effectively practiced, technical capacities of existing major ULAB-handling companies built-up and flows of economically attractive volumes of ULAB from suppliers to compliant recyclers in place, further support through the project will not be required anymore. Institutionally, the EFCCC and concerned line ministries have the mandate and also interest (as expressed in the recent legislation) to regulate the ULAB recycling sector in the future.

### Cooking Energy

EnDev Ethiopia aims at a balanced portfolio reflecting the diverse priorities of its donors and will continue to focus on promoting modern cooking solutions in a transitional approach towards e-cooking in the medium to longer term. This transitional approach will include a detailed review of the cooking habits, current trends,

customization of capacity development measures based on assessed needs and behavioural/mindset related interventions. EnDev Ethiopia follows a consumer-centric approach in line with the needs of the beneficiaries and government priorities to further boost economic growth. The programme will gradually gear up towards higher tier energy access, depending on the needs of target groups and their capacity to transition, acknowledging that such approaches come with longer lead times and higher costs. EnDev Ethiopia will spur and mainstream ICS, e-cooking and other CC energy access innovations.

Enhanced sector support in the form of policy advice to the public partners, technical support for the industry associations / alliances in the ICS sector, the focused support to the finance sector shall create a local institutional framework to continue the sector expansion with diminishing donor assistance. Parallel to this process, the overall awareness created for good quality ICS/CCS products through innovative campaigns and marketing measures supported by the project in cooperation with the other stakeholders in the country shall establish the required civic society check on the marketplace. With all the above stated core engagement that EnDev Ethiopia does with its partners, the sector will independently facilitate own independence and eventual withdrawal from donor support. In addition, a strong financial sector ready to support a stable and flourishing ICS private sector will set the right stage for exit by EnDev Ethiopia.

**Financial Systems Development:** with capacities of local institutions (Development Bank of Ethiopia, private and public MFIs, etc.) as well as MFIs associations built, the policy and regulatory frameworks on financing energy access in place, it is expected that the sector would run on its own. Furthermore, since the component would be completely outsourced to an external consultancy, part of the requirement of the consultancy will be to embed and have a local partner for country capacities to be enhanced and eventually taken over.

### **1.7.8 Gender Strategy and Safeguards**

In the current planning phase of EnDev Ethiopia, gender mainstreaming gained a big momentum in the project implementation. A focal point with two staff members is in place and actively promoting gender issues not only within the project, but also within the wider GIZ Ethiopia and our project stakeholders. EnDev Ethiopia has also continued to support the Women Affairs directorate of the Ministry of Water, Irrigation and Energy in its gender activities. EnDev Ethiopia has now established a partnership with a local association “Ethiopian Women in Energy (EWiEn)”, an association that connects and empowers Ethiopian women working in the energy sector with the aim of promoting greater visibility, networking opportunities, mentoring, and professional connections between its members and the wider Ethiopian stakeholders. In the new programming phase, EnDev Ethiopia will further deepen its support to and cooperation with EWiEn in its efforts to enhance gender mainstreaming in its undertakings as a crosscutting subject for all the proposed components. In addition, EnDev Ethiopia is developing a detailed gender-responsive strategy and plan. This will include a review of the approaches and principles of gender concepts in the different components of EnDev Ethiopia, as well as identify and evaluate EnDev Ethiopia’s gender-sensitive activities and indicators that are suitable for each intervention. The strategy will then propose and

develop the best and possible systematic strategies/guidance's/tools to effectively mainstream gender in the programme activities. Besides, the project gender analysis that was developed 2017 is under revision.

Gender and energy justice will be cross cutting issues embedded in the whole programme. The ultimate goal will be to reach an acceptable level of energy justice. Energy Justice evaluates where injustices emerge through energy related measures which affect sections of society or the community that are ignored, and which processes exist for their remedy in order to reveal and reduce such injustices.

EnDev Ethiopia foresees to carry out the following activities under the respective components. This will be beefed up further with the above-mentioned detailed gender-responsive strategy and plan that will cover all the components:

### **Mini-grids:**

Mini-grid component is delivering electricity to remote rural communities. Energy, like any other sector-specific issue, is not gender neutral. Due to the different roles played by women and men, a given energy situation and change caused by a development intervention will affect the different genders differently. EnDev's mini-grid component will mainstream gender on project planning and implementation, by systematically and consistently fostering women's participation and ascendancy to leadership levels, in particular in the cooperatives that will be supported (a 30% plan of women involvement in the Mini-grid cooperatives' Operation, Management and Maintenance staff). Furthermore, the gender and energy justice activities will be deeply ingrained in the selection of Productive use of energy activities and beneficiaries, capacity development of government partners as well as MFIs and loan opportunities to women for productive uses of energy to reach 10% target of PUE which will led by women.

### **Solar Electrification and Market Development:**

Access to electricity at household level in the context of rural Ethiopia have high potential to benefit women by providing access to information and essential services digitally. Due to the still prevailing traditional role divisions, and more so in the rural setting, women mostly are home bound taking care of the family affairs. This is in addition to providing targeted all-round support to start-ups and already established female solar entrepreneurs and proactively promoting women to join the solar business. EnDev Ethiopia will systematically promote homestead income generation activities that can be empowered by solar PV solutions (such as cooling for vegetables and dairy products) targeting women. EnDev Ethiopia will in addition promote the active involvement of women in the leadership roles in the supported solar associations and related events.

Similarly, the electrification of schools, health institutions such as health posts and health centres and other social infrastructures will have strong impacts on improving the learning opportunity of children (in particular girls) as well as the effective and efficient maternal health care including during delivery. With the use of lighting, sterilizers and basic laboratory equipment, the health services rendered to women and especially expectant and delivering mothers, will reach a substantially higher quality level and hence reduce injuries or even fatalities for mothers and babies. The electrification of staff quarters near rural health posts



and health centres will substantially increase the living quality of healthy staff, of which a large majority are female nurses. In this regard, these female nurses will be able to benefit from lighting, and the powering of phone chargers, small televisions and radios. EnDev Ethiopia shall pay special attention in building the capacities of female staff members of the institutions for them to play increasing roles in the governance of the installations. In addition, female staff at MoWIE will be involved in enabling environment discussions. EnDev Ethiopia will encourage the private sector to ensure gender mainstreaming in all support activities provided by the programme. In addition, school electrification produces multiplier effects such as facilitating better school performance, better staff retention, gender empowerment, and even reduced migration and strengthened resilience.

### **ULAB Recycling:**

EnDev Ethiopia will carry out a study on effects of unsound handling of lead-acid batteries specifically to women. Although ULAB-related hazards cut through all gender groups, promotional activities are to be designed to target the female audience. This is because they are the most vulnerable. Some of the toxicants are transferable to small children during breastfeeding or to unborn babies during pregnancy. Decreasing or ideally eliminating the risk of lead intoxication through the aforementioned activities of the project would therefore have a strong positive impact on these women's health and livelihoods.

### **Cooking Energy:**

Cooking energy related activities at the household level in the context of rural Ethiopia have high potential to benefit women and children (in particular girl-child). Women mostly are the ones who cook, fetch water, manage the household, nurse the sick and raise children. Since more than 50% of cooking energy access needs in rural Ethiopia are at the household level, the component will have a deliberate effort to ensure women benefit in the cooking energy access support packages. Gender studies have been conducted in Ethiopia which demonstrate that women trained by EnDev started successful stove businesses (production/retailing) both as secondary business and even full-time, created employment for assistants, and generated profit-making enterprises. The cooking component has a special emphasis on inclusion to keep reaching lower income and vulnerable population groups, with a specific focus on women and including refugees, and plans the roll-out of a comprehensive safeguard and gender approach. The component applies a gender and climate lens throughout the planned interventions. In the next programming phase, the component plans to carry out the following gender related activities:

1. Develop a detailed analysis to track women who are located in ICS value chains and move them into more profitable tasks within this value chain. This will involve analyzing how the women status grows through technology modifications (for ICS), additional training, mentoring, coaching, training on business skills and leadership.
2. As a subset of the broader EnDev Ethiopia gender analysis, conduct a gender analysis specifically for the ICS value chain and related plan and strategy, coupled with activities.
3. Promote the active involvement of women in the leadership roles in the supported clean cooking alliance as well as the stove associations in the regions.
4. Make a deliberate effort to ensure women benefit in the cooking energy access support packages. For instance, training of ICS/CCS producers and technicians will ensure a gender parity of 50%.



5. Ensure a deliberate effort for more jobs to be created in the ICS sector are for women to advance more equal opportunities. For example, at least 30% PUE to be led by women
6. As the global COVID-19 pandemic is influencing the lives of men and women around the world, the project is organizing COVID response strategy which will have special attention to women, considering that they are the most vulnerable, for this a sex disaggregated data including in marginalized groups of communities will also be collected to see the gender impact.

### **Financial Systems Development:**



Access to finance is often linked to provision of a collateral which most women in rural Ethiopia do not have. Collaterals (if at all) are in the custody of the men. That hinders women a chance to access financing for purchase of energy access products or for setting up / expanding their businesses. The component will target customised loan packages that innovatively benefit female gender as they are the most vulnerable. In this endeavour, the Rural Saving and Credit Cooperatives (Ru SACCOs) shall be exclusively targeted for capacity development measures (training) to give priority to women empowerment and leadership by facilitating ease of access to information loan the loan availability, the availability of short-term loans for working capital, the reasonable loan repayment schedules, and supporting of women in filling the necessary documents. .

Therefore, for the effective implementation of the above-mentioned gender action plans as well as the consideration of the previous gender analysis recommendation on the limitation of skills and tools among the management team to effectively mainstream gender, the project gender focal points conducted different awareness creation presentation as well as a workshop within the project team to create familiarization about gender equality, GIZ gender strategy and Gender mainstreaming measures.

In addition to this, the project gender focal points currently flowing up the effective completion of the existing gender analysis revision as well as the gender strategy development. In the future, the project is also planning to hire another gender consultant who can understand the upcoming results of the analysis as well as strategy to support the project management team in understanding the measures of the studies for effective implementation of the proposed gender actions plans.

# 1.8 Kenya

## 1.8.1 Summary and key data

Promoted technologies	 		
Summary of proposed interventions(s)	<p><b>ICS for Social Institutions &amp; Productive Use:</b> The project aims to increase the penetration of industrially produced stoves by supporting interventions on marketing, stimulation of access to consumer finance, distribution channels and technical and after sales services. Capacity of the informal sector suppliers will be enhanced via professionalization and expansion of qualified installer networks. Awareness creation and targeted behavior change campaigns will lead to higher demand and adoption as well as to enabling sector environment.</p> <p><b>E-Cooking pilot:</b> The pilot will implement a results-based financing initiative to help catalyse large-scale procurement of quality EPCs mitigating real and perceived risks e.g. market entry or financial risks associated with bulk purchasing but also help the companies set up distribution channels and strengthen quality assurance for the EPCs market segment.</p> <p><b>Solar for Productive Use:</b> The project will support market development and growth for solar PU market with focus on establishment and expansion of last mile distribution channels to facilitate accessibility of the technologies and services. This also includes interventions stimulating access to finance, consumer education and the enabling environment.</p> <p><b>Energy Access for vulnerable groups:</b> The project will facilitate market entry for private sector companies and supporting the development of sustainable supply chains in the Kakuma refugee settings as well as for beneficiaries of the government safety net programme. The latter builds up on the UNICEF solar subsidy programme for vulnerable populations.</p>		
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	8,880	People	<i>All vulnerable groups</i>
Cooking / thermal energy for households	513,663	People	<i>Includes 22,933 for vulnerable groups and 15,000 people for e-cooking</i>
Electricity and/or cooking / thermal energy for social infrastructure	1,660	SI	<i>includes health care facilities and schools</i>
Energy for productive use / income generation	7,655 + 200 for 3 countries for IKEA + 20 MSMEs for SCCIF	MSMEs	<i>30% (2,297) female ownership and 777 MSMEs in vulnerable settings</i>
Project period	01.01.2021 – 31.12.2023	Budget	EUR 6,029,689 <sup>38</sup>

<sup>38</sup> Of which (1) core funding EUR 3,364,371; (2) IKEA Kenya EUR 2,06 Mio; (3) SCCIF EUR 119,308; (4) SINCC EUR 486,010.

EnDev Kenya aims to contribute to a transition of the energy access sector in Kenya, to EnDev's strategic priorities, and to SDG 7, in particular the indicators 7.1.1 and 7.1.2. EnDev Kenya is following a market-based approach, with interventions that strengthen supply, enhance demand, and support the enabling environment. It makes significant contributions to EnDev's overall objectives to "energise lives", "energise jobs", and "energise climate".

## 1.8.2 Theory of change (ToC) and state of market

### State of the Cooking Energy Market

In Kenya cooking is primarily done with solid biomass (firewood and charcoal), and according to the [official 2019 national census](#) 66.7% rely on solid biomass (55.1% firewood and 11.6% charcoal) with 84.1% in rural areas. 23.9% of the population use LPG, mainly in urban areas, 7.8% paraffin, 0.5% biogas and 0.9% cook with electricity. The use of cooking technologies correlates with fuel use with majority using solid biomass stoves, mainly supplied by the informal sector. However, the penetration of industrially produced higher tier stoves is gradually increasing, particularly in urban and peri-urban areas. Electricity for cooking is still negligible due to associated high consumption and costs of electricity. In refugee/host community settings, in Kakuma, over 80.6% of households use firewood for cooking and 16.3% use charcoal with some of the households using both. Also, for [Social Institutions \(SIs\) and Micro-Small- and Medium Enterprises \(MSMEs\) the main fuel for cooking is biomass](#) (97% of primary and secondary schools, and over 50% of health facilities and MSMEs). The [EnDev/GCF project on climate friendly technologies \(2020-2024\)](#) addresses market transformation for country wide adoption of ICS, building on past EnDev achievements and particularly targeting the informal players. The Kenya Off-grid Solar Access Programme (KOSAP) promotes efficient stoves with Results Based Financing (RBF) incentives in underserved counties. The RVO SDG 7 Results project also focusses on incentivising the emerging national cookstove industry. The **niche for EnDev in the cooking sector** is therefore: social institutions, productive use, e-cooking and refugee settings.

### State of the Electrification Market

Official 2019 national census reports that approx. 70.1% of households in Kenya are electrified, comprising of grid (50.4%) and solar (19.3%) (in 2009 it was grid (23%) and solar (2%)). The electrification in rural areas is 26.3%(grid) and 29.9%(solar). The successful extension of the national grid is due to government investments in last mile connectivity, whereas the growth in the solar market is primarily driven by private sector, supported by programs such as Lighting Africa and EnDev. Innovative business and financing models notably Pay as You Go (PAYG) have facilitated growth and affordability of larger systems including DC appliances. Contrary, in refugee settings, ≈60% of HH lack basic electricity services i.e. 37% who use battery powered torches or kerosene and 22% have no access at all. The remaining ≈40% are either connected to informal diesel powered 'spaghetti' grids (12%) or use solar (29%). Majority of the 2,500 MSMEs also lack access to electricity. Further access gaps are addressed by other programmes like KOSAP, focussing on underserved countries or institutions like the Rural Electrification and Renewable Energy Corporations (REREC) electrifying public institutions in off-grid areas (app. 38,000 institutions (schools, health facilities and water projects). Most private institutions are located in grid-connected areas. A **niche for EnDev** is access to solar for productive use especially in off-grid areas (with market for most technologies still in nascent stage) and refugee settings.

The **Theory of Change (ToC)** for EnDev Kenya focuses on the above described niches in the cooking and solar sector, supporting private sector companies in supplying the market niches. The ToC describes the access limitations, especially for solar for Productive Use (S4PU), SIs, vulnerable target groups and for clean cooking with electricity. Emerging markets shall be supported and strengthened for solar as well as cooking appliances. Market development inefficiencies characterised by inaccessibility, low awareness, unaffordability, and limited products/services as well as limited investment for the businesses will be addressed by the project. Gender and safeguards will be mainstreamed in order to gain higher development impact, e.g. in terms of economic empowerment and job creation. The project will mainstream stimulus measures to reverse the impact of the COVID-19 pandemic which negatively affected business operations and demand for energy technologies/services. The detailed ToC is presented separately as an annex to this proposal.

### 1.8.3 Transformative character

#### ICS for Social Institutions & Productive Use

The project promotes improved biomass stoves (e.g. Rocket Stoves, Jiko Kisasa) that save firewood (40% saving over open fire) and charcoal (30% saving over the conventional metallic charcoal stoves) or utilising alternative biomass fuels (e.g. briquettes or pellets). The transformative idea of the project is to create a paradigm shift by professionalising the supply side of the ICS (currently dominated by the informal players) including enhancing quality assurance and involvement of more formal companies in order to increase penetration of ICS for Social Institutions (SI) and Productive Use (PU).

- **Market development:** Both the informal and formal cooking energy market players will be supported to expand their markets. The professional capacity of service providers (Last Mile Entrepreneurs (LMEs) and installers of ICS for SI & PU in the informal segment will be enhanced and expanded. At the same time production and sales of high performing ICS companies will be enhanced to contribute to market growth. Self-sustaining markets shall be demonstrated by well established distribution channels & technical services, good penetration of the respective ICS and availability of appropriate access to finance solutions. The project will also establish linkages between formal companies and informal LMEs (qualified installers) in order to bridge the gap between these players. The supply side of ICS for SI and PU is male dominated and in this regard the project will ensure at least 30% of the service providers (e.g. qualified installers) are women who will also benefit from specific women agency-based empowerment interventions including provision of initial start-pack equipment and tools for installation and/or production.
- **Economic development:** By growing and professionalising the market for SI and PU cooking solutions, job and income generation opportunities (with at least 30% of female employees or entrepreneurs) shall be created or enhanced in the supply chain potentially for areas such as construction/installation services, marketing and last mile entrepreneurship. Productive Use of Energy (PUE) for instance in restaurants or bakeries with efficient technology creates both: new business opportunities as well as cost savings. An MSME or an institution (e.g. schools) saves around 50% of fuel by using an efficient ICS translating to corresponding cost savings that can translate to more profits for MSMEs or be utilised for other investments for SIs or MSMEs, leading to further economic growth.

- **Social development:** The adoption and usage of improved cooking solutions in institutions and MSMEs will reduce fuel consumption hence reducing the pressure on the tree/forest cover thus protecting the environment. The SMES and institutions will offer better services (e.g. food-related) both for workers and people served and particularly women and children using the facilities. This will further reduce the exposure to smoke and improve safety therefore mitigating health risks.

### E-Cooking pilot

The e-cooking component is a pilot to explore market potentials on supply and demand side for electric pressure cookers (EPCs) with focus on stimulating supply for quality assured (CLASP's Global LEAP Awards) energy efficient EPCs in the Kenyan market.

- **Market development:** The availability of energy efficient EPCs in Kenya is still limited with the first commercial endeavours starting to emerge mainly targeting on-grid or mini-grid consumers. The pilot will support early mover distributors of EPCs to pilot a wider variety of pricing and financing structures, test markets and consumer reception, and focus business models/go-to-market strategies, as well as foster productive long-term business relationships between EPC distributors and manufactures. The pilot will not only help catalyse large-scale procurement of quality EPCs mitigating real and perceived risks associated with bulk purchasing, but also help the companies set up distribution channels and strengthen quality assurance for the EPCs market segment. The pilot will also generate highly valuable learnings about the unique commercial dynamics and challenges facing early movers in the EPC market, and how they could be overcome at scale.
- **Economic Development:** The early movers in the EPC market will also create income, jobs for men as well as women and business opportunities along the supply chain.
- **Social development:** The pilot will stimulate the transition of households in (peri-) urban and rural areas to move their “stove stack” up the energy ladder by including EPCs as part of the stove stack therefore in the long-term improving their living conditions (particularly for women and children) and also save energy costs due to the high efficiency of EPCs.

### Solar for Productive Use

The market for solar for productive use (S4PU) is emerging, with new technologies and business models. Most businesses operating in this space are either in pilot or pre-commercial phase with exception of solar powered irrigation and solar water heaters which is at the very early stages of market expansion. The general awareness of S4PU technologies is still low especially for low income populations. In addition, S4PU solutions, beyond plug-and-play solar home systems (SHS), are usually larger (capacity), modular and therefore require higher initial value of investment hence hindering the ability and the willingness of potential consumers to pay. The potential scale of the [market is sizable](#) but this has not been quantified specifically for Kenya. EnDev explores and supports market exploration and development for S4PU technologies and business models.

- **Market development:** The project aims to transform the market for S4PU from the current nascent phase into the expansion phase for viable and suitable solar technologies and appliances, such as solar solutions for lighting (indoors or outdoors), small scale pumping, chicken incubation and/or brooding, cooling, drying, water heating and

entertainment among others. The technology scope will cover electrical and thermal services. The electrical solutions range from pico PV, small plug and play solar home systems and modular solar systems and accompanying appliances, while the thermal solutions shall include solar dryers and solar water heaters. The market, targeting at MSMEs (of which at least 30% shall be women-led) in agriculture, fishery and trade will be characterised by better awareness of good quality products, access of technologies through well established distribution channels and availability of technical and after sales services. This shall be complemented by availability and access to appropriate consumer financing for respective MSMEs through financial intermediaries (e.g. banks, MFIs, credit cooperative societies, digital credit providers, check-off system providers (e.g. contract farming entities), asset lease to own/PAYG entities), selected via expression of interest, working in close collaboration with suppliers and innovative payment models such as PAYG. Further, the project targets to stimulate innovation on product development and deployment as well as facilitating an enabling environment for this new market.

- **Economic development:** Access to S4PU technologies will improve the efficiency and productivity of the MSMEs therefore creating additional revenue from their business operations. This can result in job creation, improved services or product quality in the MSMEs.

### Energy Access for vulnerable groups

Vulnerable groups including refugees are significantly underserved with access to basic energy services. EnDev Kenya has implemented the Market Based Energy Access (MBEA) Project in the refugee settings since 2017 facilitating private sector companies and last mile entrepreneurs to promote and sell energy products in Kakuma refugee camps. The market-based approach stimulated the interest of other humanitarian agencies and this is now one of the case studies to learn from. The rate of access to energy solutions is steady but generally slower than other established markets due to vulnerability of the people and the dependency culture that still influences market demand. However, there is need to influence the humanitarian agencies to invest more in market-based approaches as well as developing innovative payment models for the very vulnerable groups. The project will therefore continue to support companies to overcome high operation costs as well as customers to overcome low purchasing power but with more collaboration with humanitarian agencies and government.

- **Market development:** The project is creating a market for clean energy access solutions in Kakuma refugee camp, Kalobeyei integrated settlement and the host community by facilitating market entry for private sector companies and supporting the development of sustainable supply chains. Private sector companies target the provision of certified, high quality solar lighting products, as well as improved cooking solutions. By making these products available in the camp and host community, refugees and vulnerable households receive the opportunity to move from aid dependency and free hand-outs toward self-determined purchasing choices.
- **Economic development:** The project promotes entrepreneurship opportunities along the product supply chains being built by private sector companies, thus creating job opportunities for refugees and host community members, e.g. in product distribution and marketing. In addition, microbusinesses in the camp will be able to access energy products that can help improve productivity or bring down costs compared to current sources



of power or cooking fuels. Extended opening hours through solar lighting systems can also lead to additional income.

- **Social development:** Promotion of ICS (including maintenance) shall reduce smoke for households, institutions and SMEs thus mitigating health risks associated to particulate matter and consequently improving living, operating and business conditions. The fuel savings associated with the ICS shall save fuel costs and reduce the pressure on biomass resources, hence protecting the environment and reducing tensions with the host community. Promotion of solar products shall provide basic electricity services thus enabling the consumers to access communication and entertainment services as well as enabling the children to study comfortably hence potentially improving education standards.
- **Poverty alleviation:** In addition to the work in the humanitarian context, a small pilot will also be implemented to target vulnerable groups under the government safety net programme. Both interventions enabling access to cleaner energy services for displaced and vulnerable target groups aims at addressing extreme poverty and improving lives. In the context of the Government's Safety-Net-programme, the project pilots a partial consumer subsidy for the very poor. This pilot shall provide valuable lessons for government and other stakeholders on how to set up inclusive energy access initiatives.

## 1.8.4 Collaboration

### Sector alignment

Cross cutting		
1	Sustainable Energy for All (SE4All) Agenda	Government initiative whose goal is to achieve 100% universal access to electricity by 2022 and 100% universal access to modern cooking solutions by 2030 through a participatory approach for all relevant stakeholders.
2	Ministry of Energy (MoE) Gender Policy	The project will align with the MoE gender policy and support the MoE to implement some of the initiatives in the policy.
Cooking energy		
1	Ministry of Energy (MoE) Bioenergy Strategy (2020-2027)	EnDev Kenya supported the development and finalisation of the bioenergy strategy and will also contribute towards implementation particularly on the cooking energy solutions for institutions and SMEs.
2	National Climate Change Action Plan (NCCAP 2018-2022)/Nationally Determined Contribution (NDC)	NCCAC and NDC prioritise promotion of improved cooking stoves (ICS) as a high potential intervention that will contribute towards the NDC targets for mitigation of greenhouse gas (GHG) emissions. Promotion of ICS for institutions and businesses will contribute to this.
Solar for Productive Use		
1	Kenya National Electrification Strategy (KNES)	KNES defines the national electrification strategy to provide universal electricity service to all households, businesses and public facilities by 2022 with grid and off-grid solutions. The project contribution to KNES shall be through energy access for off-grid SMEs and vulnerable groups.
Energy Access for vulnerable groups		
1	Kalobeyei Integrated Socio-Economic Development Plan (KISEDIP)	This is a 15-year multi-sectoral and multi-stakeholder initiative co-led by UNHCR and Turkana County Government and is an integral part of the Turkana County Integrated Development Plan (CIDP II). The plan has also earmarked energy interventions which the agencies operating in subcounty including EnDev are expected to contribute to.



2	National Safety Net Programme (Inua Jamii)	A government programme that aims to move Kenya towards a more equitable and inclusive future focusing on vulnerable groups.
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## Implementer base

Cross cutting		
1	MoE	MoE is the leading political partner of EnDev in Kenya and therefore will steer and oversee overall implementation the project including providing overall advisory from a government perspective.
2	Kenya Bureau of Standards (KEBS)	The project shall engage KEBS on quality assurance matters for products in both the cooking and electricity component
3	Energy and Petroleum Regulatory Authority (EPRA)	The project shall engage EPRA on regulatory aspects concerning the solar and cooking sector and particularly with regards to solar and biomass regulations and standards and labelling for EPCs.
4	SDG Results Access to renewable energy (SDG 7 Results) (RVO)	With the SDG 7 Results facility, the Ministry of Foreign Affairs, in collaboration with the Netherlands Enterprise Agency (RVO.nl), aims to help achieve in particular, SDG 7, access to clean and affordable energy for all. RVO.nl implements a RBF scheme offering incentive payments to market actors in the renewable energy sector of developing countries.
5	Africa Enterprise Challenge Fund (AECF)	AECF are implementing RBF initiative of US \$ 4m targeting clean energy providers in Kenya to drive expansion of access to clean energy across the country. Collaboration and information sharing is planned.
6	Kenya Off-grid Solar Programme (KOSAP)	KOSAP under the leadership of MoE was launched in December 2018 and aims at promoting access to modern cooking and electricity (household and social infrastructure) in underserved counties. EnDev has and will continue to collaborate with KOSAP on experience and knowledge sharing particularly on the RBF instruments but also on market insights for the underserved regions.
7	Women Energy Entrepreneurs in Kenya (WEEK 2) project, Practical Action	An innovative programme of business skills training and safe, sustainable energy is lighting up a new generation of female entrepreneurs. EnDev will cooperate with the WEEK project to provide agency-based empowerment and business development training.
8	Local energy supply enterprises	The project is anchored on local energy supply enterprises dealing with promoted technologies and services. These range from companies to LMEs depending on the type of technology and the nature of the supply chain.
9	Global Distributors Collective (GDC)	The project, where applicable, will explore collaboration with GDC in this on last mile distribution interventions
Cooking energy		
1	Clean Cooking Alliance (CCA)	EnDev and CCA will collaborate to ensure that the sector is well coordinated and specific interventions complementary. Both will also explore joint support to CCAK technically and/or financially.
2	Clean Cooking Association of Kenya (CCAK)	CCAK is still a young sector association, needing to be strengthened for being able to add value and handle sector issues on behalf of its members. It is also an important organisation with regards to sector coordination. EnDev supports CCAK as lobbyist for a better sector environment.
3	Modern Energy Cooking Solutions Program (MECS)	CLASP is working closely with MECS to explore the market and standards for electric cooking. MECS is a £40M UK AID-funded program

		aimed at accelerating the development and uptake of modern energy for cooking, in particular e-cooking.
4	Efficiency for Access (EforA) Coalition	CLASP is also the co-secretariat of the EforA coalition, a group of 15 donor organizations dedicated to promoting energy efficiency as a potent catalyst in global clean energy access efforts. EforA is currently partnering with several companies in East Africa to assess the viability of on-bill asset financing for appliances – including EPCs – in both the mini-grid and weak-grid markets. This research will directly inform the implementation of the EnDev e-cooking pilot.
<b>Solar for Productive Use</b>		
1	GIZ - Water Energy for Food (WE4F) project	This is a GIZ project with focus on water, energy and food nexus and will be targeting similar technologies and private sector players as EnDev. EnDev will therefore work closely with WE4F and complement each other especially on innovations, linkages, access to consumer finance, experiences and expertise.
2	Sector Associations	The project shall support the efforts of the sector associations i.e. GOGLA and Kenya Renewable Energy Association (KEREAA) in lobbying for a better business environment for their members particularly those in the S4PU space.
<b>Energy Access for vulnerable groups</b>		
1	GIZ - Energy Solutions for Displacement Settings (ESDS) Project	This is a GIZ project which seeks to improve the energy access through market-based approaches in displacement settings both on a household and camp/settlement-infrastructure level via advisory services to UNHCR, policy level advocacy and the implementation of technical measures in Uganda, Kenya and Ethiopia. The focus for Kenya is in Turkana County.
2	UNHCR, Food & Agriculture Organisation (FAO) and World Food Programme (WFP)	These agencies work in Kakuma and SNV will engage with them particularly on the aspects of Cash Based Interventions (CBI) for the vulnerable refugees for ICS and solar products as well as proposed briquette production.
3	Norwegian Refugee Council (NRC), International Crescent of the Red Cross (ICRC), Lutheran World Foundation (LWF), LOKADO	These NGOs work in Kakuma on various topics related to SNV activities (e.g. WASH, services to schools and hospitals, firewood procurement) and SNV is engaging with them regularly as required.
4	Kakuma & Kalobeyei Challenge Fund (KKCF)	The KKCF, managed by AECF, provides grant funding to companies including those providing energy access. SNV is engaging with AECF in the implementation and supporting linkages to beneficiaries under the MBEA project for follow-up and expansion funding.
6	County Governments of Kilifi, Kwale and Taita Taveta	E4I will work with the relevant county units in the selection of the vulnerable groups to supported to access ICS through a subsidy pilot.

### Leverage / spin off

	Project/Initiative	Description
1	Green Climate Fund (GCF), Promotion of Climate-Friendly Cooking: Kenya and Senegal, 2020-2024, ~ EUR 26 million	EnDev/GCF builds on achievements of EnDev Kenya in the area of access to modern cooking. The project aims at ICS market transformation, and at global knowledge exchange on contribution to NDCs. EnDev/GCF focuses on professionalisation of ICS enterprises to

		become formal businesses and significantly increase adoption and usage of ICS. EnDev core will not implement interventions in this area.
2	Sustainable Energy for Smallholder Farmers in Ethiopia, Kenya and Uganda, funded by IKEA Foundation, 2021-2023, ≈ EUR 2 million	The Kenyan component of this project is integrated in EnDev Kenya portfolio and implemented by GIZ and SNV. The project focuses on promotion of productive use of energy solutions targeting smallholder farmers and with focus on dairy and horticultural value chains. Therefore, EnDev core excluded dairy and horticultural value chains.
3	Social Impact Incentives (SIINC) Pilot Project Kenya, 2020-2022, ≈EUR 450,000	The objective is to provide Social Impact Incentives as a form of 'proof-of-concept' to initially up to three selected energy enterprises based on measurable impact achievement. Companies selected in the SIINC pilot are not considered for similar incentives under EnDev core.
4	Smart Communities Coalition Innovation Fund in Kenya and Uganda (SCCIF), 2021-2022, from 10,000 € to 120,000 € per innovator	SCCIF provides financing windows for advancing commercially sustainable solutions to renewable electricity access for refugees and host communities in refugee hosting areas of Kenya and Uganda. One project selected in Kenya will pilot business models for solar powered bicycles in Kakuma/Kalobeyei. This is a unique intervention under EnDev Kenya and contributes to S4PUbut is not duplicated under EnDev core.

## Nexuses

The anticipated nexuses within the project includes:

- Energy/agriculture/water nexus (S4PU e.g. solar powered pumping) in collaboration with GIZ-WE4F project
- Energy/health nexus (ICS SI & PU e.g. reduction of smoke and installation of stoves in health care facilities) in collaboration with Ministry of Energy (MoE), Ministry of Health and county governments
- Energy/education nexus (installation and maintenance of stoves in schools) in collaboration with MoE and Ministry of Education
- Energy/environment nexus (ICS SI & PU e.g. reduction of biomass resources through fuel savings) hence contributing to the bio-energy strategy.
- Energy/gender nexus (women's empowerment in agricultural MSMEs, in energy supply companies, as LMEs as well as in terms of new female jobs created in energy supply companies etc). This will be done in collaboration with WEEK project implemented by Practical Action.

## 1.8.5 Modalities

EnDev Kenya project components including implementing organisations is summarised in the table below:

#	Component	Implementers
1	ICS for Social Institutions & Productive Use	GIZ, Energy for Impact (E4I), Practical Action (PA)
2	E-Cooking pilot	CLASP
3	Solar for Productive Use	GIZ
4	Energy Access for vulnerable groups	SNV, E4I

## ICS for Social Institutions & Productive Use

EnDev builds on past implementation experience of ICS interventions in this component, but ICS for SIs and PU was not promoted intensively and systematically. However, a few proactive stove installers were provided with the necessary skills for ICS SI/PU segment on need basis and thus yielding sales. GIZ, E4I and PA will similarly provide business development support services for the companies promoting industrially produced stoves while at the same time professionalising the service providers (stove installers) in the informal space. This will be coupled with targeted awareness creation to stimulate demand and appropriate enabling environment measures. The social institutions targeted include schools, health facilities, religious institutions among others. New business opportunities will be created for the professional stove installers e.g. in provision of professional services for formal companies (e.g. stove installation or maintenance) and markets will be built for formal stove companies (manufacturers or distributors). The geographic distribution foresees, PA operating in Homabay and Bungoma counties, E4I in Kilifi, Taita Taveta and Kwale Counties and GIZ in 20 other counties. The **main intervention areas** include:

- **Performance based market development for industrially produced stoves:** The penetration of industrially produced stoves shall be increased for SIs and MSMEs by providing results-based support to qualifying companies with focus on marketing, access to consumer finance, distribution channels and technical and after sales services. Women-led companies and/or companies with specific targets on women customers will be given special support/incentives to benefit in this intervention. Based on expression of interest, companies promoting ICS for SIs and MSMEs will be competitively selected to be supported by the project. The support shall be provided via results based financing or technical assistance based on pre-agreed milestones. The incentive/TA structures shall be designed during operationalisation but will focus on mitigating temporary market development barriers and stimulating market development.
- **Expand and professionalise the network of qualified stove installers or contractors and related business development support:** The capacity and number of qualified stove installers will be increased to facilitate access to quality services for end consumers. The interventions focus on training/retraining, mentorship, professionalisation and marketing support. The support will be intensified for best performers who deliver results and grow. The qualified installers will also be linked to manufacturers to provide marketing, installation and maintenance services hence providing more opportunities for them. The linkage will be through provision of outsourced services through contracts, temporary/casual employment or as agents.
- **Women will be equally** involved in the interventions for market expansion and demand creation. Specific incentives, awards, and recognition for companies with higher professional female employment and women LMEs will be piloted to complement the capacity building efforts and mentorship. Successful women enterprises will be showcased as champions of promoted technologies to create awareness and inspire others.
- **Stimulation of innovation for stoves for PU & SI:** The technological advancement for stoves for SI and PU has generally stagnated due to limited innovations. However, there is potential for innovation in technological and business model aspects includes e.g. multi-functional stoves, multiple fuels technologies, affordable technologies, adaptation of technologies to new uses, performance improvement of existing technologies, distribution channels, access to finance etc. A small innovation facility (about EUR 25,000 per

year) will be integrated in the project to target individuals, universities/technical training institutions or companies to develop practical innovations focusing on performance, business models and access to finance.

- **Demand side targeted behaviour change campaigns and consumer education for stoves for PU & SI:** Penetration of improved cooking solutions for SIs and MSMEs has been hampered by limited consumer awareness, socio-cultural perceptions and readiness for behaviour change. Targeted behaviour change campaigns and consumer education shall be implemented (addressing e.g. Association of Schools Heads, Chamber of Commerce, Ministry of Education, County Health Departments among other relevant networks), to facilitate informed decision making and stimulate demand creation. A comprehensive demand and penetration survey amongst SIs and MSMEs (including needs assessment) shall be carried out in collaboration with the relevant government agencies (Ministry of Energy, Ministry of Health, Ministry of Education and Council of Governors). Sensitisation of responsible government agencies/institutions & counties shall also be carried out to inform joint planning and promotion of improved cooking solutions. Organised women groups reaching out to new customers will be supported to carry-out outreach events on a performance basis.
- **Improving the enabling environment through engagement with public health authorities and facilitating quality assurance:** The public health authorities at the county level are mandated by law to provide health clearance permits for institutions, hotels, restaurants, food vendors among others. This therefore provides a good platform for lobbying the public health authorities (at national and county level) to promote and encourage improved and clean cooking solutions (including cleaner kitchens) in order to reduce health risks associated with indoor air pollution and improve public safety. The public health authorities will be involved in the promotion of improved and clean cooking solutions for MSMEs and a joint strategy will be developed. The Ministry of Energy will be supported to take lead in coordinating the efforts (with the Ministry of Education and Health) for promoting ICS for social institutions in the public sector. To foster quality, KEBS Biomass Stoves Performance Requirements KS: 1814:2019 provides quality parameter for an institutional biomass stove. The project will intensify awareness on good quality stoves, train stove installers on KEBS standards and intensify quality surveillance of the installations. A voluntary certification initiative to certify installers of larger SI and PU stoves shall be established and anchored in CCAK.

### E-Cooking pilot

CLASP will build upon the UK AID funded EnDev RBF pilot EPCs, which ended in November 2020. The pilot will be implemented in collaboration with the MECS programme to identify quality EPCs, early mover distributors and to learn about adoption and behaviour change.

The implementation will involve deployment of RBF incentives to distributors to mitigate the initial market entry barriers for EPCs to further scale up the market towards the expansion. The incentive structure shall be designed to address the specific needs of the distributors with a general objective of addressing specific barriers in procurement, distribution and/or marketing of EPCs with focus on behavioural change. The pilot will be structured into four **main intervention areas** as described below:



- **Qualify suppliers and distributors:** The 2020 Global LEAP Awards for EPCs will serve as the mechanism to qualify suppliers. Distributors will be accepted into the program via the submission of an Expression of Interest (EOI) providing the basic information about organizational capacity to participate in the pilot (e.g. on financial capacity, internal systems, business models etc.) but more importantly indicating specific market barriers and how they will be addressed through the pilot with emphasis on additionality and delivery of results. The selection criteria will also be geared to give advantage towards companies with gender specific measures and targets (in line with MoE gender policy and the gender analysis report).
- **Establish incentive levels and allocate incentives:** Incentives will be allocated through a reverse auction process. Reverse auctions require distributors to submit bids for specific per-unit incentive amounts applied to specific units of EPCs to be delivered to end consumers but also specifying barriers to mitigate in order to achieve the results. The bid evaluation process will anchor value-for-money as a core parameter thus encouraging interested companies to submit bids for the lowest workable per-unit incentive. Based on the data from the previous pilot, CLASP will set boundaries for the auction to ensure equity and inclusivity and mitigate market/price distortion risks.
- **Incentive disbursement and sales monitoring:** Companies will report sales to CLASP on a monthly basis and will receive incentive disbursements 1) upon initial verification that the transaction underpinning an incentive claim is legitimate, and 2) upon verification that end customers have purchased products. CLASP anticipates using the internal and external-facing systems developed for the prior round of Global LEAP+RBF for tracking participant-specific customer data and administering customer verification survey work. CLASP also anticipates using the same verification agents.
- **Evaluation and dissemination of learnings:** CLASP will collaborate in the collection, analysis and synthesis of data generated from the pilot and produce and disseminate relevant knowledge products including adoption and usage, technical performance, information on end user pricing schemes and purchaser profiles.

### Solar for Productive Use

The market for S4PU is still nascent. EnDev has implemented initial pilots to test the market. EnDev therefore plans to systematically serve off-grid MSMEs with solar systems and respective appliances including solar thermal solutions. The following are the **main intervention areas**.

- **Market development particularly with regards to last mile distribution, marketing and after sales support:** The focus will be on establishment and expansion of last mile distribution channels to facilitate accessibility of the technologies. The project will support private sector companies in S4PU market segment on market development and growth with focus on establishment and expansion of last mile distribution channels to facilitate accessibility of the technologies and awareness creation. This will also include enhancement of technical/after sales support for S4PU products in order to boost the confidence at the consumer level and this will be complemented with opening/activation of new markets and sustained marketing activities. This support shall be provided on a performance/ results basis where potential companies are required to express interest (Eoi) with emphasis on specific temporary market barriers hindering their growth and

development. The call for Eols shall be based on a needs assessment, during operationalisation, to specify for each technology segment a suitable incentive structure. The support shall be provided and sustained based on pre-agreed milestones with selected companies. The selected companies shall also be expected to take lead in the prioritisation and implementation, but the companies will also be required to leverage additional investment. In addition to the companies, the project shall provide capacity building for LMEs through business and technical training but also through supporting implementation of effective consumer education and demand creation activities at grassroot level.

- **Access to consumer finance for solar PU technologies particularly MSMEs:** The project aims to stimulate and scale different models of appropriate consumer finance in order to enhance access to S4PU technologies. The project shall run a competition of ideas targeting different types of financial intermediaries (Microfinance institutions (MFIs), Savings and Credit Cooperatives (SACCOs), Agricultural Insurance Service Providers, Crowd funding providers) interested in developing and scaling consumer finance solutions. This may also include consortia of financial intermediaries and distributors/manufacturers. The winning viable ideas shall be supported by the project through provision of performance/results-based incentives in line with the agreed upon activities and milestones. The aim of the incentives is to support the financial intermediaries to mitigate barriers limiting the development and scaling of appropriate financial products for S4PU. The scope of support shall include development of financial products, improvement of existing financial products, partial mitigation of default risk, marketing of financial products, collaboration with suppliers of good quality products and expansion to new regions. The specific needs of the financial intermediaries will however determine how they use the incentives.
- **Awareness creation and consumer education for S4PU technologies:** S4PU technologies are new particularly for small scale traders and consumers in rural and off-grid areas and therefore there is a general lack or inadequate awareness of these solutions, and more so those of good quality. The project will therefore aim to facilitate targeted consumer (MSMEs) education events to facilitate demand creation. These shall focus on 'below the line' (BTL) awareness campaigns and innovative digital outreach campaigns (e.g. through social media influencers and digital educational initiatives).
- **Enabling environment:** A number of enabling environment barriers are foreseen to limit the market development for S4PU. These include: uncertainty and unpredictability in regulatory and legal framework for the solar sector in Kenya, particularly on fiscal policies/laws (taxes), infiltration of poor-quality products/services for PU, combined with low awareness of quality assured products/services at last mile supply and consumer levels, insufficient market intelligence for solar PU particularly at micro-level. The following activities are ear-marked to mitigate these barriers:
  - Conduct participatory evidence-based research to capacitate private sector to lobby for predictable government policies, regulation and legal environment, particularly with regards to fiscal policies/laws and quality assurance as well as integration of S4PU in economic strategies.
  - Support and provide guidance to sector coordination through technical assistance to relevant sector associations and working groups, in particular KEREIA in collaboration with GOGLA e.g. KEREIA with support from SNV is undertaking a study on market barriers for PUE in Kenya.



- Generate market intelligence at macro and micro levels to inform and facilitate the decision making of private sector players on expansion and growth.
- Support the private sector (e.g. via KERECA) to establish a voluntary quality assurance framework for S4PU technologies (in line with global e.g. Global LEAP, VeraSol etc. and local standards).

## Energy Access for vulnerable groups

### Refugee settings

Activities in the refugee settings will be implemented by SNV, building on past EnDev experience. The focus will be on intensifying technical assistance for the enterprises operating in Kakuma with focus on supporting the development of local supply chains for energy access products targeting households, institutions and businesses. The project will provide performance-based technical assistance/financial support, tailored to the prevailing situation on the ground, to companies to guarantee delivery of sales and support activities such as roadshows, marketing and awareness raising campaigns. In addition, SNV will focus on technical assistance to companies and humanitarian agencies to deliver on the objectives of the project.

- **ICS for households:** The project will roll-out a behavioural change campaign (BCC) on clean cooking in parallel to proactively recruiting distributors of improved cookstoves into the project. The BCC activities will target refugee households with messaging suited to their cultural backgrounds based on detailed research undertaken to this effect. Further, the Stove Production Unit (SPU) will continue to receive support with a primary focus on technical assistance to enable the private sector operator to expand current activities in stove production for household (and institutional) stoves.
- **ICS for SI and PU:** The project will continue to train more stove technicians to provide stove construction/installation services but also partner with companies promoting the industrially produced stoves for institutions and businesses. This shall be done in collaboration with relevant humanitarian agencies. In addition, the project shall facilitate maintenance and repair services for existing institutional stoves that are currently broken. The project shall also explore collaboration with other relevant agencies operating in Kakuma to increase the sufficiency and penetration of institutional stoves.
- **Solar for Households, SIs and PU:** The project will facilitate market entry of companies focused on solar technologies for households, and systems targeting microbusinesses and other productive uses. In addition, SNV will provide technical assistance to intensify marketing activities and further improve distribution channels and after sales services. With a focus on the productive use of energy, SNV will continue to gather market intelligence for companies and support targeting of businesses with appropriate energy access solutions in refugee settings. For SIs, SNV will identify ways to work with partners to address the challenges for existing solar installations in e.g. schools where a lack of maintenance is a key barrier for efficient operation of the systems.

- **Cash Based Interventions (CBI) Pilot:** To complement the market-based approaches, SNV will investigate opportunities to partner with UNHCR, WFP and FAO and will seek additional donor funding to pilot CBI for energy access. This shall provide valuable lessons for either scaling up or adoption by other humanitarian agencies, with the aim of facilitating reaching the very vulnerable groups who cannot afford the products under normal market conditions.

### **Other vulnerable groups**

E4I targets vulnerable groups under cash transfer programme beneficiaries in the government safety net programmes. E4I will implement the activities in the coastal part of Kenya and this will build up on a solar subsidy programme implemented by E4I and funded by UNICEF. The specific activities comprise:

- Identification of vulnerable community members and create awareness on the benefits of improved cookstoves. The identification process shall be done in collaboration with the county governments targeting vulnerable groups in the cash transfer programme.
- Create opportunities for availability and ownership of improved cookstoves by the vulnerable communities through affordable subsidy/payment mechanisms. The targeted vulnerable people shall be provided partial price subsidy (75% of the stove price) and they will contribute the remaining 25% in order to access the stoves. The subsidy and stove delivery shall be provided upon confirmation of the contribution from the targeted vulnerable people.
- Create business opportunities for stove suppliers who shall receive technical assistance from the project.
- Generate evidence of how improved cookstoves impact the vulnerable communities' quality of life. This shall provide valuable knowledge on inclusivity of vulnerable groups in energy access programmes.

## 1.8.6 Results

Project results	Targets (2010 - 2023) <sup>39</sup>	Additional Targets (2021 - 2023)	Other target dimensions
People: Access to Electricity	470,800	8,880	<ul style="list-style-type: none"> <li>All in humanitarian context (SNV)</li> </ul>
People: Access to Cooking	3,825,877	513,663	<ul style="list-style-type: none"> <li>Incl. 494,104 ICS<sup>40</sup> as baseline of EnDev/GCF project</li> <li>Incl. 2,455 as government safety net beneficiaries (E4I)</li> <li>Incl. 15,802 in humanitarian context (SNV)</li> <li>Incl. 7,366 e-cooking beneficiaries (CLASP)</li> </ul>
SI: Access to Electricity	73	N/A	
SI: Access to Cooking	3,000	1,660	
PU: Access to Electricity	6,760	4892	<ul style="list-style-type: none"> <li>498 MSMEs in humanitarian context (SNV)</li> <li>1468 female headed MSMEs</li> </ul>
PU: Access to Cooking	3,500	2763	<ul style="list-style-type: none"> <li>171 MSMEs in humanitarian context (SNV)</li> <li>829 female headed MSMEs</li> </ul>
Job creation	452 FTE	452 FTE	<ul style="list-style-type: none"> <li>At least 282 female jobs</li> </ul>
tCO2 emission reduction	809,902 annual saving	809,902 annual saving	

Overall, the project is expected to improve markets and impact on economic and social aspects particularly with regards to improvement of livelihoods through income generation activities and job creation as well as social inclusivity with regards to energy access. Specific outcomes on gender have been set to further contribute to gender equality and impact on women economic empowerment. In addition to the above quantified results, below is a summary of the context of the results and additional qualitative results.

Remark: As described in the [GCF Funding Proposal FP 103](#) the baseline for the EnDev/GCF project “Promotion of Climate-Friendly Cooking: Kenya and Senegal” shall be the results of EnDev 2020/12 outcomes (people with access to modern cooking) plus an annual growth rate of 5%. This was considered as the Business as Usual (BAU) scenario. This EnDev/GCF baseline is therefore attributable to EnDev core outcomes.

### ICS for Social Institutions & Productive Use

EnDev Kenya will focus on ICS for SIs and PUE. The details of PUE targets for MSMEs with ICS are provided separately as an annex. Specific qualitative outputs are the following:

- Comprehensive market study and needs assessment for cooking energy for SIs and MSMEs to inform market players
- Policy paper on improved and clean cooking solutions to inform government and facilitate inclusion of sustainable cooking solutions in public institutions

<sup>39</sup> Incl. UK Aid RBF

<sup>40</sup> These are the results of 2020/12 outcomes plus an annual growth rate of 5%. This was established as baseline for the EnDev/GCF project and hence is considered as results still attributable to EnDev.

- Framework for quality control and assurance for improved cooking solutions for SIs and MSMEs

### E-Cooking pilot

The e-cooking pilot will complement the biomass cooking interventions under EnDev core and EnDev/GCF to explore potentials in the cleanest (tier 5) cooking solutions. This pilot shall explore market potentials for EPCs as well as customers' willingness for adoption and behaviour change with a specific target of reaching 3,000 households. Specific qualitative outputs are the following:

- Position paper on e-cooking to share the lessons from the pilot, especially on market readiness as well as adoption and behaviour change, to inform future interventions in the e-cooking sector in cooperation with other EnDev e-cooking pilots e.g. Bangladesh, Nepal, Tanzania and Uganda.

### Solar for Productive Use

The market for small SHS for households in Kenya has grown tremendously over the last 10 years, but mainly in high potential areas. Growth has not reached underserved areas, which are now addressed by KOSAP. EnDev Kenya has therefore transitioned from Solar for households to Solar for productive use. The details of PUE targets for MSMEs with solar solutions are provided separately as an annex. Specific qualitative outputs are the following:

- Market data for solar productive use to support private sector investment and growth
- Policy paper (with evidence) on the economic benefits of solar for productive use technologies to inform government fiscal policies and incentives for the solar PU sector

### Energy Access for vulnerable groups

Both beneficiaries in humanitarian as well as government's safety net contexts remain to be an important target group for energy access in Kenya. The following qualitative outputs are planned:

- Policy paper on inclusivity of vulnerable groups in energy access programmes as part of LNOB to inform and influence government safety net programmes
- Position paper on energy access programmes for refugee settings based on the lessons of EnDev to provide knowledge and information to humanitarian agencies including Cash Based Interventions (CBI) Pilot.

## 1.8.7 Sustainability

### Cooking energy

The description of sustainability and exit strategy for the cooking energy interventions reflect on a) access to improved cooking solutions for SIs & productive use (ICS for SI and PU), b) the e-cooking pilot and c) access to ICS for vulnerable groups.

a) The path to sustainability for the ICS for SI and PU will be stimulated and strengthened through transformation of the supply side from the current informal nature to a more formal one. This shall be characterised by a critical mass of skilled service providers (for construction and installation) as well as increased penetration and involvement of formal stove

manufacturers/distributors (which is currently low). The linkages between the formal companies and skilled service providers shall also be enhanced to sustain the transformation. There will be deliberate efforts to ensure at least 30% of the supported enterprises or LMEs are women-led.

b) For e-cooking, the interventions are geared towards identification and supporting early movers of EPCs. The selection process shall focus on stronger importers/distributors capable of stimulating and exploring the EPCs market and more importantly, those with capability of attracting more investment for this nascent market segment. The pilot shall provide the sector with a critical data set about end user behaviour, for more nuanced understanding of market dynamics surrounding EPC adoption and therefore provide relevant market intelligence information for expansion and investment into the EPC market segment.

c) Market development for ICS in Kakuma refugee camp and Kalobeyei integrated settlement will focus on building self-sustaining market structures and distribution networks. The project engages private sector companies, who take lead in the delivery of services and distribution of ICS. Supporting local staff recruitment processes and stakeholder engagement with local community leaders will further ensure that private sector companies are fully integrated in the local market, therefore able to resolve challenges without SNV support.

The table summarises information on project sustainability reflecting different perspectives.

#	Sustainability perspective	Details
1	Financial	The project interventions are focused on supporting specific companies to stimulate, grow and sustain the market. This is through technical assistance and results-based incentives targeting critical market barriers. The companies shall be supported to mitigate critical market barriers and position their businesses to attract investment for growth. Especially those companies shall be selected as eligible, which are likely to attract investment both directly and indirectly. Furthermore, the project shall generate knowledge and market intelligence information to inform potential investors and facilitate investment during and after the project duration.
2	Institutional	Leading for enabling environment, are particularly MoE as lead government agency, EPRA as regulator and KEBS as standards body. At private sector level, close collaboration with CCAK particularly supporting relevant lobbying and advocacy measures towards enabling business environment is planned. In the humanitarian context EnDev is operating within the framework of KISED P and contributing towards the achievement of this plan. KISED P has a thematic working group on Sustainable Energy Solutions.
3	Ecological	Promotion of energy efficient cookstoves (and where relevant use of alternative cooking fuels) will reduce the pressure on biomass resources. With the (app. 40%) fuel saving technologies, less firewood and charcoal is used, hence wood resources are less exploited/degraded (this is of particular relevance in humanitarian context, where the pressure on fuel supply is very high). At the same time fuel reduction also means reduction of non-renewable biomass consumption, which relates to reduction of CO <sub>2</sub> (GHG) emissions.
4	Technological	The quality assurance framework for both off-the-shelf and installed products including relevant awareness creation shall be enhanced. The distributors of off-the-shelf products shall provide reasonable warranties and after sales service in addition to compliance with the Kenyan quality standards. Where quality standards are inadequate, the project will facilitate their development and educate the consumers on the same. ToTs for installation and maintenance shall provide future trainings for

#	Sustainability perspective	Details
		<p>new installers beyond the project period. The market intelligence information will stimulate R&amp;D and innovation of products particularly for EPC products hence broadening the choice of devices available to end consumers.</p> <p>The SPU established in Kakuma will fully be placed under private sector management. SNV will only provide technical assistance and support to develop new stove designs, incl. training for further expansion of the LME network to provide products and related services. Furthermore, the project facilitates distributors of stove manufacturers to set up a base and sustain their operations in Kakuma refugee camp, for after sales services near the customers.</p>
5	Social	<p>ICS shall improve the infrastructure in institutions and SMEs thus facilitating better service delivery and providing better conditions for workers and people served. This will further reduce the exposure to smoke and improve safety therefore mitigating health risks. The e-cooking solutions shall facilitate the transition to higher tier cooking and shift the consumers up stove-stacking ladder hence improving their living conditions (particularly for women and children) but also saving energy costs due to the high efficiency of EPCs. Furthermore, the entrepreneurship and job creation opportunities emanating the project shall improve livelihoods within and after the project.</p> <p>In humanitarian context, behaviour change campaigns will be a key tool to ensure lasting change among vulnerable households, with a focus on promoting benefits of cleaner cooking solutions. Adoption of ICS improve the living conditions of the users and at the same time reduces social pressure on limited biomass resources. Further livelihood means for MSMEs (income generation and job creation) are generated and the infrastructure in SIs is improved.</p>

## Solar energy

The description of sustainability and exit strategy for the solar electricity interventions reflect on a) solar for productive use and b) solar for vulnerable groups.

a) The implementation of the solar for productive use intervention will be anchored on private sector with supported companies selected on a competitive basis and consideration of sustainability entrenched in the selection process. The project will support the companies to support temporary market barriers thus facilitating the sustainability of their growth and business operations. The participating companies will also take lead in identifying specific needs as well as implementation in order to facilitate prioritisation of effective activities to address the barriers. This shall be complemented by capacity building efforts for last mile entrepreneurs/service providers who shall boost the outreach and access to end consumers. In addition, stimulation and upscaling of appropriate access to finance solutions shall facilitate the affordability of the solar PU technologies.

b) Market development for access to solar in Kakuma refugee camp and Kalobeyei integrated settlement will focus on building self-sustaining market structures and distribution networks. The project engages private sector companies, who take lead in the delivery of services and distribution of energy access products. A specific focus will be on ensuring sustainable operations, including after sales services and e-waste management. Supporting local staff recruitment processes and stakeholder engagement with local community leaders will further ensure that private sector companies are fully integrated in the local market, therefore able to resolve challenges without SNV support.



Further elaboration in accordance with the sustainability perspectives is provided:

#	Sustainability perspective	Details
1	Financial	<p>Partnership of suppliers and financial intermediaries with emphasis on access to consumer finance will unlock funding to consumers thus improving the affordability and demand for solar PU products. In return, this shall provide the necessary sales turn-over and cashflow for suppliers therefore improving their bankability and thus opening up opportunities for accessing working capital financing which has been a challenge for most suppliers.</p> <p>Close engagement with humanitarian agencies and local community leaders lends credibility to the private sector, therefore increasing willingness to pay, and can also help with the identification and tracking of defaulting customers. The project continues to monitor the political and regulatory framework with regard to access to finance for refugees carefully to identify possible interventions going forward.</p>
2	Institutional	<p>The project will be steered through the existing sector level institutions and mechanisms to enhance institutional implementation capacities beyond the project. Sector level coordination, lobbying and advocacy will be steered through sector level associations specifically KERIA and GOGLA. Policy, standards and enforcement will be steered through the relevant Government ministries and public institutions more specifically MoE, EPRA and KEBS.</p> <p>In the humanitarian context EnDev is operating within the framework of KISED (detailed earlier) and contributing towards the achievement of this plan. KISED has a thematic working group on Sustainable Energy Solutions.</p>
3	Ecological	<p>The project will promote solar powered solutions, which is a renewable energy source. These renewable energy technologies replace diesel or petrol-powered generators for PUE (e.g. water pumping or irrigation) as well as kerosene lamps for lighting in humanitarian contexts.</p>
4	Technological	<p>The interventions will focus on quality products with a reliable quality assurance mechanism such as the provision of warranties and meeting existing quality standards e.g. VeraSol certification and KEBS. The interventions will also include technical training of technicians to provide localised technical and after sales services including maintenance and repairs which shall last beyond the project. These technical trainings will also be institutionalised in a few technical training institutions for future training needs for solar PU.</p> <p>In the humanitarian context SNV facilitated some solar companies together with distributing companies to set up a base and sustain their operations in Kakuma to ensure after sales services near the customers. The project creates linkages between trained technicians from local vocational training institutions (e.g. Don Bosco Technical training institution) with private sector solar companies active in the camp.</p>
5	Social	<p>The interventions under this component are expected to improve livelihoods within and beyond the through the business or income generating opportunities as well as job creation in the supply value chain and end-user level.</p> <p>Adoption to solar technologies in humanitarian context means improvements of living conditions of users, of livelihood means for MSMEs (income generation and job creation) and of infrastructure in social institutions.</p>



## 1.8.8 Gender Strategy and Safeguards

### Gender Analysis

The Gender Analysis (GA) for EnDev Kenya was carried out in December 2020 (first draft in January 2021) by an independent national consultant. The findings and recommendations of the GA can be summarised as follows: EnDev (meaning all implementers) are challenged to build capacity and mainstream gender, to implement along gender indicators, to train partners and to establish gender knowledge exchange platforms. Addressing project implementation, more systematic support for female headed enterprises and for female employment is recommended. More sensitization on gender roles, cultural and behaviour change was recommended in order to enhance acceptance and demand. In terms of MRV data collection and reporting on milestones and results (e.g. via producers and LMEs) should be expanded to be gender-disaggregated and a feedback mechanism should be established to report on gender discrimination. The GA provides a Gender Action Plan (GAP), with respective activities and a list of indicators – both at activity as well as output/outcome level.

### Gender Strategy

The Gender Strategy is based on the recent GA as well as the ITAC recommendations from previous programming cycle (2019). Gender mainstreaming is reflected in three areas: a) project implementation processes, b) partners and enabling environment, and c) beneficiaries.

**a) Project implementation processes:** The project will implement selected relevant gender-related activities recommended in the GA and measure their accomplishments along the proposed gender indicators (Results Framework). The basis are the objectives in the GAP of EnDev Kenya:

- Gender mainstreaming capacity in the project teams is increased including ensuring having specific gender focal person who will coordinate the mainstreaming of gender into project activities. The project staff shall also be oriented and trained on the gender aspects of the project.
- Women and men benefit equally from the project and this shall be achieved through gender equality during the identification and selection process of project participants and beneficiaries.
- Differentiated needs of men and women are taken into account in project activities for instance e.g. favourable training durations, favourable venues e.t.c.
- Specific roles of men and women are harnessed as agents of change for instance showcasing successful women entrepreneurs or consumers and using them as the ambassadors to inspire change
- Potential unintended negative gender-related project impacts are prevented. This shall be achieved through a grievance mechanism limited for primary project beneficiaries i.e. LMEs and companies supported by the project.
- Institutional frameworks for gender mainstreaming are strengthened particularly with regards to building the capacity/training of Ministry of Energy staff to facilitate putting the MoE Gender Policy into practice

**b) Partners and enabling environment:** In 2019, the MoE launched its Gender Policy with the overall goal being promotion of gender equality and equity within the energy sector in

Kenya. There are 3 relevant objectives of the policy: to increase awareness on gender in the Energy Sector; to integrate gender in programs, monitoring & evaluation; and to promote clean cooking solutions and environmental sustainability. The project will contribute towards the objectives of the policy through supporting and building the capacity of women led enterprises and employment of women.

**c) Beneficiaries:** Capacity building and support of project beneficiaries (private sector energy companies and LMEs as well as customers (HHs, SIs, and MSMEs) will be gender sensitive, to some extent even gender transformative. Equal opportunities to access training, support, and consequently benefits of the project will be assured (at least 30% of either gender). A specific focus shall be in companies, which hire female professionals even in male dominated professions (e.g. solar technicians) and women-led companies as well as female LMEs. The project shall also identify, partner and support organised women groups (e.g. Women in Sustainable Energy and Entrepreneurship (WISEe) Co-op Society Ltd) demonstrating effective capacity building, outreach and awareness approaches to complement the project capacity building awareness activities. The support provided shall include incentives, recognition, awards, capacity building and mentorship.

### **Peace and Conflict Analysis**


In 2017 the Kenya Conflict and Context Analysis was carried out. It concluded, Kenya does rank relatively high in terms of conflict and conflict potential. This “manifests in perpetual tensions and violence related to elections; rural based conflicts overgrazing land perpetrated by pastoralists pitted against other pastoralists, agriculturalists, private conservancies and security forces; and more recently related to Islamic extremism and terror attacks. Underlying these conflicts are challenges in governance of politics, natural resources especially land and potentially mining, ethnic relations, and distribution of public resources.” The analysis judges that “Kenya is unlikely to contain its security threats sustainably in the near future. It follows that organizations like GIZ must remain vigilant in monitoring the security situation and security actors, and where possible, provide whatever capacity building that might be needed at their project and program levels, as well as to the Kenyan government.”

### **Environmental safeguards**

The project, in supporting solar companies, will prioritise in those that have strategies and measures for products end of use life. This will be considered as an added advantage while identifying and selecting the companies to be supported. It will however not be a critical selection criterion, since most companies do not have recycling/take back schemes. And this will not apply for LMEs who source their products from several suppliers.

# 1.9 Liberia with Sierra Leone and Guinea

## 1.9.1 Summary and key data

Promoted technologies			
Summary of proposed interventions(s)	<ol style="list-style-type: none"> <li>1. To enhance market development, the project will provide technical and management advice to professionals of key stakeholders (especially public entities and SMEs) in the RE sector in form of training workshops, business development services, on the job training, and e-learning. A special focus will be to increase the number of trained women by 20% and strengthen their technical and management role.</li> <li>2. The project will promote information brokering and networking in all three countries. For this purpose, EnDev will support collection and sharing of data and information about RE installations, markets, projects, etc. in cooperation with national and international partners. EnDev will also contribute to a better coordination of activities and the creation of synergies between projects by connecting stakeholders through organization of meetings, national and regional conferences, bilateral and multilateral discussions, and by promoting the digital ICT4Renewables tools (data collection app, mapping tool, web portals, e-learning app, social media).</li> <li>3. A particular focus of the work will be on improving the sustainability of RE installations and mini-grids. The sustainability approach for public facilities consists of an information system with key data about all installations, b) the establishment of regular maintenance routines and c) a repair mechanism with secured funding. EnDev also works towards financial and institutional sustainability of professional organizations in the RE sector, including strengthening the role of women through management and administrative training. EnDev includes in its activities to promote environmental and social sustainability and behavioural change messaging for reducing health impacts of charcoal and firewood use, batteries, water, deforestation, promoting measures towards gender equality and against climate change.</li> <li>4. EnDev will incubate innovations in the RE sector by supporting pilot projects and demonstrations.</li> </ol>		
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	40,000	People	<i>number of people (women/men) trained.</i>
Cooking / thermal energy for households	10,000	People	<i>Technical and management capacity of public partners, SMEs, and professional associations for RE and ICS and the role of women in these significantly improved.</i>
Electricity and/or cooking / thermal energy for social infrastructure	1000	SI	<i>Increased number and quality of monitoring, maintenance, repair, and replacement of photovoltaic installations</i>
Energy for productive use / income generation	24	MSMEs	<i>Increased use of established platforms on information sharing, (e-)learning and networking</i>
Project period	01.01.2021 – 31.12.2023	Indicative Budget	<b>3,000,000 EUR</b>

EnDev started its activities in Liberia in 2012, as the country had one of the highest deficit rates in terms of access to modern energy in Sub-Saharan Africa. About 15% of urban residents and less than 3% of rural residents had electricity access largely from self-generation with gasoline or diesel generators using expensive imported fuel. Over 95% of the population depended on firewood and charcoal for cooking. The use of improved cook stoves (ICS) played almost no role. EnDev's focus in the beginning was to initiate markets for solar lighting products, ICS and solar dryers for rural areas. In 2015 during the Ebola period, EnDev Liberia extended its activities to the neighboring countries Sierra Leone and Guinea as all three countries were heavily affected by the disease. The focus of the work shifted towards the electrification of health facilities and schools for lighting, communication, and cooling, and to provide solar lanterns to affected households. In 2017, when most of the Ebola and post-Ebola interventions phased out, EnDev started again to revitalize the nascent market for solar products, improved stoves, and solar dryers by supporting the private sector and initiatives of the three governments. In parallel, EnDev continued its activities for the electrification of social institutions (mainly health centers) and initiated several measures to make solar installation more sustainable, including establishing a database system about all installations and a regular check of their functionality. As several international organizations started to work in the three countries during and after the Ebola period, EnDev, as one of the key players in the energy sector, became an information broker for new projects and new organizations.

In the current phase until the year 2023, EnDev Liberia (with Sierra Leone & Guinea) will continue:

- a) to support activities that provide access to energy for households, social institutions, and productive use in cooperation with the private sector, public institutions and NGOs and
- b) be an information broker and catalyst, supporting the main actors to coordinate and initiate activities.

In the next three years, EnDev will strengthen women and e-learning in the energy sector and hand-over some activities in Liberia to partners, while increasing support to sustainable activities for Sierra Leone and Guinea.

## Summary and key data

For the period from 2021 to 2023, EnDev Liberia (with Sierra Leone & Guinea) requests a budget of 3 Mio Euro for its activities and collaborations in 3 countries. With these funds

1. EnDev provides **technical expertise** to stakeholders (solar technologies and to a lesser extent improved cook stoves (ICS)). This includes formalized technical and non-technical teaching, practical on-the-job training, including theory and increasingly by e-learning for a broad range of RE professionals on different levels; a focus is to increase numbers of trained women by 20% and strengthen their technical and management role. This applies for both, women in the sector, women trained but not sufficiently employed in the sector and women entering the sector.
2. The project supports **information brokering and networking** for three countries. EnDev in cooperation with partners (companies sharing key data, associations, government agencies and NGOs) facilitates data and information collection and sharing (offline and online) on

renewable energies to develop and innovate the market, secure and improve tracking of systems, strengthen RE awareness, learning and know-how. Based on strong understanding of the RE markets, EnDev connects stakeholders to coordinate and create synergies. The project supports partners to organize meetings, national and regional conferences and discussions. EnDev also adapts, shares and uses the developed digital ICT4Renewables tools (data collection app, mapping tool, web portals, e-learning app, social media) for effective coordination, transparency, accountability and learning. Key challenges here are the establishment of a local structure that can run the information brokering and networking after the end of the EnDev intervention and the creation of more gender responsiveness.

3. The project **advocates for sustainability** in interactions with stakeholders. The sustainability approach for public facilities consists of three components: a) establishment of an information system with key data about all existing installations (largely ready), b) establishment of regular maintenance routines (partly realized) and c) a repair mechanism with clear responsibilities and secured funding (under discussion). EnDev also works towards financial and institutional sustainability of professional organizations in the RE sector, including strengthening the role of women through management and administrative training. EnDev includes in its activities to promote environmental and social sustainability and behavioural change messaging for reducing health impacts of charcoal and firewood use, batteries, water, deforestation, promoting measures towards gender equality and against climate change.

4. EnDev **incubates innovation in the RE sector**. To speed up markets and activities of different stakeholders, EnDev proposes or demonstrates as pilot projects innovative approaches or technologies, for example (solar) electrical transport, energy efficiency measures, innovative cooking techniques, cooling and heating technologies, PAYGO, battery charging stations and a diversity of productive use technologies. For the pilots, EnDev builds on initiatives that address concrete problems and creates good examples, attention and markets for RE in the country.

Building on the effects of past facilitating activities, EnDev aims to contribute that between 2021 and 2023 at least 200,000 people will gain access to electricity, 50,000 people will gain access to improved cooking, 4,000 Social Institutions will get access to electricity and 1,000 Social institutions to modern cooking services. As EnDev will closely cooperate with other organisation and use leverage effects as much possible, the results will depend as well on the activities and time schedule of other organisations. That makes it difficult to attribute detailed target figures to specific markets in the three countries. It is estimated that 50% of the targets will be achieved in SL, 35% in Liberia and 15% in Guinee. We expect that at least 20% of the targets can be counted for EnDev directly. There will be at least 120 additional mini grids and/or other forms of energy access for productive use established. EnDev will be involved in most of these mini-grids so that again around 20% of the results will be attributable to EnDev.

Key partners at the governments within a large cooperation network are Rural and Renewable Energy Agency and Ministry of Mines and Energy in Liberia, Ministry of Energy and Health in Sierra Leone and Rural Electrification Agency in Guinea.



## 1.9.2 Theory of change (ToC) and state of market

Theory of Change - EnDev Liberia, Sierra Leone, Guinea			
<b>Impacts</b>	<b>Energising Lives - Social development</b> Better health services Reduced gender inequality Better learning environments More income in some households	<b>Energising Opportunities - Economic development</b> More jobs, especially for (rural) women Improved income for (cocoa) farmers Increased economic activities	<b>Energising Climate - Combating climate change</b> Reduced GHG emissions Reduced deforestation More awareness about climate change and importance of protecting environment
<b>Assumptions</b>	RE technologies will become more accessible and affordable and improve living conditions RE expertise, supply chains and activities will improve		
<b>Outcome</b>	Professionalized and growing RE activities in which donors, private sector, public sector and NGOs support each other long-term reliable energy access in most health facilities and many other social institutions		
<b>Assumptions</b>	Good experiences with high quality RE products and services will increase demand, networking and collaborations will help to reach out to more rural areas, female professionals will shape sector with creative new approaches		
<b>Outputs and results</b>	<ul style="list-style-type: none"> <li>RE professionals offering high quality RE products and services</li> <li>Synergies, collaborations, informed and good planning and decision making in the sectors</li> <li>Long-term access to solar energy with good maintenance and quick repair,</li> <li>More and stronger female RE professionals</li> <li>Success experiences about Electric transport, large PV systems and other innovations in sector</li> <li>Success experiences about modern and at the same time cost-efficient charcoal production</li> <li>Dissemination of efficient cook stoves</li> </ul>		
<b>Key interventions</b>	Increasing Technical Expertise and Logistics: Trainings, supervision, testing, e-learning, storage  Supporting Information sharing, collaboration, networking: Apps, Web portals, meetings, virtual market place  Advocating for Sustainability: Establishing system for monitoring, maintenance and repair of solar systems, solar hotline, strengthen female RE professionals and sector associations,  Incubate RE Innovation : Electric tuk-tuks and bicycle with solar charging stations, larger photovoltaic systems, passive energy (greening of buildings)		
<b>Barriers</b>	<b>Supply side barriers</b> • Low expertise, especially about maintenance and repair • Lack of finance • Most business owners are male • High costs for importing & transporting products • Low numbers (small, scattered population) high risk when trying out innovations	<b>Demand side barriers</b> • Poverty (low ability to pay) not easy to detect quality of products or services • Low awareness • Bad experiences with low quality • Ignorance and lack of entrepreneurs to try out innovative productive use	<b>Enabling environment barriers</b> • Corruption • High taxes, tariffs, duties • Investments are risky due to lacking or unreliable regulations • Weak private sector associations for advocacy • Weak political structures for coordination, investments, cooperation • no or insufficient regulation, especially concerning environmental impacts • false economic framework: neglect of the consequential costs of the overexploitation of nature
<b>Assumptions</b>	Markets for modern renewable energy products and services offer few profitable business models, especially for rural areas. Poverty limits ability to pay, poor road conditions make it difficult and expensive to reach rural areas, duties, taxes and corruption increase the costs of products, especially since most of them have to be imported.		
<b>Root cause</b>	Only few people and businesses have good expertise in renewable energy and can ensure good quality. Few products and services are offered at relatively high costs, hardly reaching rural areas. Importing solar products is expensive (taxes, duties). Ability to pay is low due to poverty.		
<b>Core problem</b>	People strive for good living conditions as defined by "modern" life. Such living conditions require access to various forms of energy. In the Mano River counties, access to clean energy is limited for most people. Some available forms of energy are based on fossil fuels (Diesel generators, cars) or contribute to deforestation (wood or charcoal for cooking) and have detrimental effects on health of people and planet. Less harmful technologies for energy generation or use are not yet available or affordable for large groups of the populations.		

### General remarks

EnDev Liberia, Sierra Leone and Guinea are among the poorest countries in the world according to the HDI classification. The region has a specific history (many years of war, Ebola, COVID, political instability) and hence very weak institutional structures along with a high degree of poverty, small and very young populations and low education, income and health level. Therefore, the three countries need long-lasting support in all relevant aspects (gender, knowledge, management, finance, policy, compliance, environment) to breed more actors and establish markets for modern renewable energy technologies and to electrify the public sector in a sustainable way. But there is an impressive wealth of mineral and natural resources and abundant rainfall and solar radiation, which is not sufficiently tapped, used or distributed. EnDev has been active in the region for eight years with a stable team

expanding from Liberia, over Sierra Leone to Guinea with the largest market. The project has good knowledge of the energy sector and is well connected to all major stakeholders.

### **Access to Electricity**

According to the data from World Bank, the rate of access to electricity in Liberia has increased from 9% in 2012 to 25% in 2018. In rural areas the access rate grew from 3% to 7.5%. Thus, the combined activities of the different international organizations have contributed to a substantial increase in access to electricity during the EnDev period. The situation in Sierra Leone and Guinea are similar. Gender-disaggregated data, such as on electricity access, specific electrification needs and the structure of actors in the sector are currently not available. Women are disadvantaged in participation in consultation and planning processes due to their social status and poorer access to education and information. Regarding domestic work performed, women and children suffer to a particularly high degree from a lack of access to electricity and from substitutes for electric lighting that are dangerous and harmful to health.

For the foreseeable future, most of the population will have access to electricity only in the form of decentralized systems (mini-grid, standalone systems). Grid Electricity, if available at all, is expensive and often extremely unreliable in the provincial capitals and worse in the countryside. Donors and Governments all agree that only a mix of centralized and decentralized solutions will be able to supply the larger part of the population in the medium term, and full supply will not become possible through central electricity provision, wherever derived from. Quantities of electricity demand and supply do not match the cost for a full power grid covering the huge distances.

The three countries need decentralized solutions for achieving universal access to electricity. However, despite the progress made in the last 8 year, the market for decentralized electricity technologies is still in a pioneering stage and still requires substantial financial, technical and management assistance.

### **Market situation**

Around 175 companies are active in the electricity market in the three countries. Most of them are only active in one of the three countries and cover small or very small market segments. About 60% of the companies are organised in associations which are EnDev partners. The majority of companies are installing and/or selling solar products. Some few companies are operators of mini-grids. They often manage more than one mini-grid but use a growing number of sub-contractors. The number of companies offering PayGo systems is still very low (one digit) but growing.

Many donors are willing to provide one-time funding for the installation of solar systems and the construction of mini-grids. However, what is missing are systematic capacity development measures for the main stakeholders covering a broad area of subjects such customer-oriented management, quality control, marketing, sustainable operation, maintenance, technical know-how, book-keeping, business concepts etc., In all these areas, stakeholders show significant deficits, which are the main barriers for market development. In addition, the level of coordination between the different projects is poor and only takes place on the



highest levels between governmental agencies, donors and private sector. It does not reflect the actual coordination and communication needs on the present working and implementation level. EnDev is filling the capacity development gap as well as the coordination of activities through an information broker role.

## Cooking

Access to modern cooking technologies is very poor in Liberia, Sierra Leone and Guinea. According to the data from SE4All 0.7% of households in Liberia and 1% in Sierra Leone have access to clean cooking systems. Households in the capitals and major cities use mainly charcoal with inefficient stoves, whereas in rural areas firewood and three stone cookers are the predominant cooking system with all the well-known negative impacts on health, gender equality and forest areas. Especially in Sierra Leone on the Freetown Peninsula the situation is very serious as deforestation has reached dramatic levels causing strong erosion and landslides with hundreds of deaths and affecting the water supply to the capital as the water absorption and storage capacity of the soil is drastically reduced. In addition, the Mangrove Coastline, the nutritional base and protection against floods and climate change, is eaten up by firewood and inefficient charcoal production and consumption, as well from inefficient smoking kilns.

## Market situation

So far, in Liberia, Sierra Leone and Guinea, the commercial clean cooking markets are still small with only 25 relevant producers and stove importers. However, the number of producers is increasing, partially with small exports beyond national borders including Guinea. Most manufacturers produce less than 10 stoves a day and typically one type of stove. Only the company *Westwind* in SL and *envirofit* in Liberia offer a broad range of products which are produced on a semi-industrial base or imported. *Westwind* is also one of the few companies exporting stoves to neighboring countries.

The market for ICS suffers from weak demand and supply deficits. The weak demand is the result of the low costs of firewood and charcoal, the perceived high costs of the advanced cooking technologies and the lack of awareness about the benefits of ICS. On the supply side, most companies have little technical and management skills. Marketing and customer-oriented management measures are generally weak. Only a few companies such as *Westwind* have the potential to grow rapidly in the coming years.

An important aspect of the cooking sector is that not only the stoves are highly energy inefficient but also the whole value chain of charcoal starting with an inefficient production of charcoal in traditional kilns. Thus, the overall efficiency of cooking with charcoal is usually around 10%. This means that 90% of the initial energy is wasted. With advanced but still simple technology, a significantly higher overall efficiency would be possible. However, there is currently no market for advanced kilns as the needed investment costs of 2500 EUR are considered too high, although modern kiln with service times of at least 10 years leads to a return of investment time of only 2 years.

EnDev is addressing the market barriers for ICS on the demand and supply side by awareness creation, providing technical, business, marketing and management advice and

providing targeted funding to activities in the sector, such as supporting cooking associations, that cannot be covered by the companies.

### **1.9.3 Transformative character**

#### **Market development**

The RE and ICS markets in the Mano River Union are in their pioneering phase. Low-income levels, the economic setback caused by Ebola and Covid-19, weak distribution channels, insufficient service infrastructure and the lack of technical and management expertise are huge market barriers.

However, gradually, markets are growing and there is a real chance that at least the market for RE will reach the next development level due to significant financial resources invested into this sector. The high public demand for RE will allow companies to install an increasing number of systems, sell more products and to become a major player in this sector. However, the growth of the sector has to go hand in hand with an improvement of the technical and management capacities of the involved companies and governmental and non-governmental entities. Otherwise, there is a high risk that projects and investments will fail at the end. Customers could become disappointed at the quality of products or installations. Operation and maintenance could be so poor that most of the installed systems will only be operational for a few years. EnDev's approach for supporting a transformative market development in the RE sector is to fill this gap and provide technical, business and management support to companies as well as to public stakeholders and civil society actors. In addition, EnDev is facilitating information exchange between the main actors on the ground to improve the data and information base of projects and promote cooperation between partners. Supporting mini-grid investors and operators will play a particular role as up to 120 mini-grids will be installed mainly in Sierra Leone and Liberia. They are an important motor that qualifies and creates sustainable and gender-sensitive employment and slowly allows increased productive uses, especially for women. Thus, EnDev will give special attention to this sub-sector.

ICS markets and markets of other modern cooking systems are developing slower. EnDev supports the well-established companies Westwind in SL and Envirofit in Liberia as well as smaller companies producing the Red Fire Pot in cooperation with UNDP, Mercy Corps, Mary's Meal and LEAP. EnDev role is to support awareness creation, production processes, quality management (including the testing of stoves) and marketing. Activities comprise training and financial support, as well as testing of new and larger stoves and the promotion for cooking systems for social institutions and productive use. EnDev is also working on an initiative to introduce efficient kilns for charcoal production as this could contribute to a significant reduction of wood consumption. In combination with sustainable forestry, it would be possible to provide the needed resources without further deforestation and land degradation. However, transforming the charcoal sector towards a green and sustainable market is a mammoth task, where EnDev can only give some initial inputs.

In addition to working with individual manufacturers, EnDev is supporting creation of associations such as the national Clean Cookstove Alliance in SL as a voice of this sector

## **Economic development / productive use / income generation**

Off-grid renewable energies are so far predominantly used for consumptive purposes including light. Most markets for solar operated productive use appliances are small, scattered, badly organized, with low quality of products, weak sustainability and little sales volumes and still largely depend on donors.

However, especially for mini-grids, where larger number of consumers and more excess energy is available, the productive use market is visibly growing and tested.

Estimated market figures of electric appliances (annual sales) for productive uses are: Solar drinking water pumps (>500), fridges (>2000) battery and telephone charging stations (>150), solar dryers (>2000), solar pumps (>200) telephone towers and hubs (>150); other productive uses are for food and cold drinks, agriculture, craftsmen and clinics; some institutional stoves; and some other and newer productive use approaches are often still pilots only (welding, server, commerce, large cooling, transport). However, the growing number of mini grids with relevant production and even excess of electricity give room for broader applications of productive uses. Women are specially benefitting from productive use of RE as several of them concern businesses where women play a key role (retail shops, artisanal textile production, food processing, telecommunication etc.).

There are some economic developments through better availability of solar electricity in the agriculture, crafts, trade, administrative, tourist, entertainment, and semi-industrial sectors. However, beyond funds, sometimes only relatively small things are missing, like information, knowledge, contacts, marketing, or awareness for productive use. That is where EnDev comes in towards providing information, supporting the private sector to do investments and receive additional capital by leveraging, identifying, communicating and facilitating (including support application) sources from donors, NGOs, governments, banks, financing instruments and related private businesses, which are sometimes available but cannot be found. EnDev thrives to contribute that restaurants and caterers use solar and ICS (institutional size), that farmers increase income from solar dryers of cocoa and other products and through storage through cooling (initial stages), once they are sufficiently informed and the existing knowledge gaps can be bridged. EnDev is working as well on microcredit recently made available for stoves in SL to be then used for productive uses and larger institutional ICS as well. EnDev is aware that the services currently provided to the private sector has to be taken over by national entities on medium and long run. Therefore, EnDev is cooperating as much as possible with existing business development and advisory services and with business associations.

## **Social Development**

An overwhelming majority of clinics, hospitals, laboratories, schools, training centres, community and youth centres, orphanages, border stations, Government offices, prisons and other social institutions have no, poor or unreliable access to electricity and other energy sources, thus reducing their function and effectiveness substantially, in the health sector with constant deadly consequences. Where generators are installed, fuel is often not available. Where solar systems are installed, they are mostly still undersized, only serve parts of the buildings; equipment is sometimes or often not sufficiently understood, maintained and repaired in case of problems, often due to a lack of maintenance or lack of availability of

maintenance funds or bad communication. Mini-Grids with solar system for hospitals as anchor, however, increasingly supply adjacent schools, settlements and sometimes small productive investments. The range of medical and laboratory equipment that can be serviced by solar energy is increasing, as well through the installation of larger solar systems in larger hospitals and laboratories now, including the actual main Ebola hospital in Guinea, where EnDev just helped to deliver a truck with solar material and technicians to bring electricity to that hospital. .

With over 1,000 social institutions that have solar systems so far, in which EnDev had a strong role, EnDev has gained a lot of experiences in the design, installation, monitoring, maintenance and repair of PV systems with a dedicated and highly professional team. EnDev is passing on its experiences to the public as well as to the private sector to improve the design (including proper sizing) and quality of systems and their installation and to encourage maintenance and monitoring of PV systems in social institutions. This way, EnDev contributes that public institutions can provide better, reliable service to its clients and improve its effectiveness. It also helps to create more trust in the capacity and role of social institutions among the rural population.

Endev puts and will put special emphasis to strengthen the role of women in the energy sector through a range of empowerment measures, by providing platforms, targeted e-learning, implementing special solar career projects at schools, promoting employment of women in the sector and by considering gender aspects of installations such as security.

## **Poverty alleviation**

In Liberia, Sierra Leone and Guinea, the expansion of electricity supply takes place primarily in urban areas and sometimes only for rural elites in larger communities. High electricity fees often make access to electricity unaffordable for the poor, even though some mini-grids have social basic and minimum tariffs. Social disparities and the poverty gap in urban, in rural and between urban and rural areas are sometimes deepened.

EnDev activities ultimately aim to improve energy access and living conditions for all people, especially for poor people or currently underprivileged ones. EnDev wants to leave no one behind.

NGOs supported by EnDev sometimes target solar lights and ICS to those in highest need, even after Ebola and COVID are finished.<sup>41</sup> Electrification activities for clinics including very remote areas, (e.g., sometimes not to be reached by car, often not even by motorcycle or bicycle), can arrive at very vulnerable groups. Similarly, EnDev contributes to light in orphanages, for under privileged and extremely poor children without any family or support. EnDev takes care that also girls benefit from these activities as they are often left out even there. Alphabetization in night schools focus those who had to work as children to make the family survive and thus never went to school. When they can calculate their sales figures for their product now, it makes a difference when negotiating with the wholesaler and increases the range of employment options as well.

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<sup>41</sup>For a story from EnDev collaboration partner [We Care Solar](#)

EnDev creates rural employment on a small scale and scattered, through awareness creation and supporting RE retailers and associations to expand into rural areas, e.g. with Pico PV sales in rural areas, as well through small business, commerce, cooling, sewing.

Outreach to the poor increases with substantial growth in PAYGO Systems (recently another official launch as well for Liberia for some new retailers and projects with a few thousand new systems) and an increase in Grid Connection; Mini- and Nano-Grids being installed in larger number now, and which give the poorer strata of society a chance to participate. As well new battery charging and lending stations powered by solar, reach several thousand people.

#### **1.9.4 Collaboration**

A key element of EnDev's strategy is the close cooperation with national and international partners to maximize its impact. The objective is to use own resources in an efficient and effective way, create strong synergy effects and fill particularly those gaps that are left by others and needed to develop the RE sector. As energy is a crucial means for the development of other sectors, EnDev not only aligns its activities with partners in the energy sector but also with major actors in the fields of health, environment, vocational and higher education, gender, forestry, agriculture, biodiversity, regulation, finance, lands, enforcement, transport and water. EnDev is often a relevant voice in those sectors and seen as a visible and often important actor on interrelations and cooperation in those fields.

EnDev works with the governments to strengthen the role of RE in the different policy areas aiming at an environmentally and socially sound development. In finance, priorities for renewable energy technologies are not sufficiently well set. In the Ministries of Energy and some energy partners still have a way to go to understand, that biomass is energy as well (and energy and electricity are not identical), and that and why renewable energy is preferable to diesel generators; and if solar is chosen, that they need monitoring, maintenance and repair strategies and follow-ups and that the money saved on diesel should go back to solar maintenance and replacement of parts. EnDev constantly reminds stakeholders to broaden their perspectives when planning or implementing activities to also consider possible effects to forestry, agriculture, nutrition and water; or to training, sustainability, gender and employment. For Environmental Protection and Climate Change related activities, EnDev increasingly becomes a relevant nexus voice and actor through advocacy and energy interventions, as well and particularly within the UN community.

Even though the direct funding contribution of EnDev per country and year is small, through its reliable presence and ardour, there is a considerable leverage to move things towards long-term use of renewable energy and EE in those three countries through its strategic cooperation with almost all relevant partners and its strong visibility. Development Organizations, NGOs, Governments and private sector partners primarily fill the financing gap, that allows EnDev to catalyse and secure a larger number of investments and projects and allows those partners to reliably invest into RE and EE in a way that makes sense in the long run.

Beyond its actual physical and political results in the renewable and stove sector, EnDev leverages discussion particularly on longer term income and employment development strategies and its relationship with sustainable forestry to sustain soil, water, cooking energy and

biodiversity. EnDev is as well a visible actor in terms of gender, where female RE professionals strengthened by EnDev showcase that technical professions are not reserved to men and women can often do better than men.

EnDev explores strengths and capacities of each institution and active actors and assists accordingly where necessary, if strategically viable and where synergies are likely or already proven. With its relatively small budget, EnDev must leverage activities with partner contributions or, rather help partners to leverage their contribution to reach maximum quality and sustainable output. In many cases, donor partners have funding available but lack the technical know-how, qualified personnel and the management capacities and infrastructure to implement projects. Most fields of cooperation mentioned in the selection below are still barriers for a faster dissemination of the appropriate technologies. EnDev is well connected and maintains good relationships with all development partners in the sector and provides a platform for all. Other partners (except for RREA) work on a singular project/program basis on renewable energies and ICs; so EnDev is a key to the development and furtherance of the renewable sector as a whole.

The private sector and partner-centred approach improves sustainability. Important examples for Cooperation partners:

- EnDev assists financially and as advisor the RE private sector organizations LEAP, REASL and APER in all 3 countries and thus supports over 100 private companies.
- With the Ministries of Energy and the Rural and Renewable Energy Agency (**RREA**) and international partners (**WB, AfDB, EU, UK Aid, UNOPS, USAID**) we discuss regulatory and policy issues regarding the sector development in meetings with political and financial stakeholders.
- EnDev assists **WeCareSolar (WCS)** in training, installation, monitoring, system registration and developing maintenance schemes with spare part stock (coordinated with MoH) in 2 countries.
- EnDev supports **Welthungerhilfe (WHH)** since long on projects with EU and KfW to plan, procure and install solar systems and to develop a maintenance scheme with the MoH and MoE again in two countries; we also cooperate with WHH in the field of ICS in the poorest region (South East) and start a solar support scheme to a radio network in SL with radios in all counties.
- We assist **Mercy Corps, Plan International, Oxfam, EFA and a range of other small and large NGOs** with training, marketing, advice to implement different projects such as development of a Paygo system, employment promotion, installation of nano-grids or ICS dissemination, outreach & PR, solar lamps for schools and school children or to help maintain and repair their systems financed from EU.
- The **European Commission (EC)** is a strategic EnDev partner in all three countries: We help with information and advisory services to identify and implement projects and find reliable partners in the field of large off-grid projects, grid extension, vocational training, sector policy and regulations.
- **Swedish Embassy** is supported to channel funding to viable private sector companies. The Embassy is an important strategic sector coordination and financing partner especially regarding the support of promising private enterprises (AECF, REEEP). EnDev helps to bring together and support these enterprises.

- **GIZ/KfW** projects (Health, Transport, Mining, Environment, Agriculture) and **the German Embassies** often finance the hardware of solar systems particularly in health, whereas EnDev takes over installation and training of administrators and operators of their partner networks.
- With **Tony Blair Institute (TBI), Power Africa, Power for All, SE4All, ACE** we jointly plan further support of LEAP and REASL, a national and a regional conference and PR material in both countries and cooperate on a range of strategic topics (duty free, gas, regional cooperation, maintenance).
- We cooperate with **USAID<sup>42</sup>, Millennium Challenge Corporation (MCC)<sup>43</sup>, and the Liberian and Sierra Leonean Electricity Corporations and regulatory bodies LERC** to develop a medium-term planning for grid and off-grid activities including spatial outreach and vocational training in the 3 counties.
- Besides our own gender approach we support as well gender programs from the **Ministry of Gender and UN Women** with joint activities and training focusing on women (**GCI, EPP, TVET, FLS, Barefoot, WIREs**).
- We support training institutes (**Universities, Vocational training, other schools, Ministry of Higher Education**) through singular or longer-term trainings and in the planning for a new vocational school and support towards a stove laboratory.
- We cooperate with a range of **church organizations** a. o World Vision, the Lutheran and Catholic Church and John Bosco in Liberia and Sierra Leone on a range of school and clinic projects (procurement, clearance, training, infrastructure).
- EnDev works with the **Ministries** of Mining (Cadaster of Licenses), Energy, (RE registration) Health (clinics, hospitals), Gender (ICS) Transport, (electrify transport) Agriculture (solar irrigation, dryers), Environment (deforestation, protected areas, reforestation), Education (curriculum and certificate licensing harmonization), Finance (duty free import and export), Police (enforcement) to integrate more renewables into their policy approach and assists on request on a range of projects and mainly technical and environmental issues.
- EnDev supports UN Organization to plan, reinstall, monitor and repair (**UNOPS, UNICEF, UNDP, WHO, UNIDO, FAO**) their solar systems and refrigerators, or design and assess broader development programs with a ICS or renewable component;
- EnDev cooperates with **MoE, UK Aid, UNOPS**, and other energy sector stakeholders (regulator, utility, WHH, private companies) on Mini-Grid operation, training, staff selection and strategy Thus, we support the operators of over 100 mini-grids to repair, maintain, operate and manage their systems.
- In the Clean Cooking Sector, besides the private sector, EnDev cooperates with the creation of the Clean Cooking Alliance in Sierra Leone (**CCASL**) and a broader data collection and approach towards clean cooking.
- In Guinee, EnDev cooperates with the **Ministries of Energy, the Guinean Rural Electrification Agency, the Ministry of Health and the Ministry of Education** (rural electrification installation and maintenance of PV systems in health and school facilities).

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<sup>42</sup> With USAID presently in a program to monitor and repair 70 health facilities and involve the Ministry of Health in Sierra Leone into this – like our approach in Liberia, where the Minister herself starts to use the Monitoring App

<sup>43</sup> <https://www.mcc.gov/>



- EnDev cooperates with international institutions to improve health and school structures in Guinea including -**Plan International**, **PASA** (support to national hospital laboratories), **Fondation Mérieux**, and support of **LABOGUI** with funding from **AFD**).
- EnDev also works with GIZ projects in Guinea (Education, Health, Mines) to electrify schools, hospitals, health centres and health posts.

### **Sector alignment**

EnDev is fully aligned with the formal policies of the sector (Rural Energy Strategy and Master Plan for Liberia, Energy Revolution in Sierra Leone, Energy Plan in Guinea). One goal of the Liberian Pro-poor agenda aims to establish a stable macro-economic environment enabling private sector-led economic growth, greater competitiveness, and diversification of the economy through investment in infrastructure (roads, energy, air and sea ports, ICT, water and sanitation) and human capital development. We participate in various stakeholder meetings, including Rural Energy High Level Monthly Meetings (Government and Donors in Liberia, in Sierra quarterly) and co-organize the Integrated Forum for Renewable Energy in Liberia (IFREL) and APER in Guinea for all RE and ICS stakeholders. We closely collaborate with many stakeholders from public sector, private sector, medium-size investors, donors, and NGOs. EnDev is active to foster open exchange, discussion, synergies and collaboration. EnDev is often the missing link that make ends for projects meet and thus to successfully realize.

### **Implementer base**

In Liberia: Various stakeholders address barriers of lacking funds and regulations with policy support and by financing mainly grid extension and hydropower – areas where EnDev is involved to a lesser degree and contributes only with advice, planning and information sharing.

In Sierra Leone the focus is even more on the private sector and its organization, exchange and training including mini-grid operators, gender and deforestation.

In Guinea it is more program related. On the Regional Level, apart from the private sector with regional outreach or ambition, we work with the Mano River Union, ECREEE, ECOWAS, regional companies, UNOPS, Welthungerhilfe, AfDB; to a lesser extent with Power for All, Power Africa and SE4All.

EnDev solar technicians are mainly trainers and supervisors and strengthen local technicians, they jump in where infrastructural support (transport, storage, specific advice) is needed and often operate regionally as well;

**Leverage** effects are considerable through close collaboration with investors (large solar units), governments, business community, donors and finance sector, and NGOs. According to our estimate EnDev is bearing around 20% of the total cost (hardware and software) of solar projects that directly provide access to modern energy. Hence, the leveraging effect is 1:4; furthermore, we create leverage through our networks, and our IT communication channels including websites, newsletters and Facebook pages. We regularly receive requests for collaboration or technical assistance from public or private sector or NGOs. Mostly, they have funds and wish to spend them for renewable energy solutions, but feel insecure how to organize it, whom to trust, where to buy etc. The private sector is taking his time to invest into own and larger solar systems as well, but once convinced starts to pick up a relevant

market share for hotels, banks, supermarkets, housing schemes and residences and thus transforms the market.

**Nexuses** exist especially with the health and education sector (impact on SI, E-Learning, IT applications). There are strong interconnections with the vocational training sector. EnDev has a qualified team of technicians, with a reputation for good advice and good teaching, one coordinator has a TVET background. EnDev works with Vocational Training Institutes and their large Aid Programs in Liberia and Sierra Leone (MCC, GIZ, Oxfam, EPP, TVET, UNOPS, ECREE, EU) to implement and develop profound, professional and practical formation and expertise in the renewable energy and electrical sectors. For example, a new vocational training school (20 Mio Euro Project) is planned and built with EU funds by GIZ in Liberia, where solar technology will be one key faculty and is meant to be the source of energy. EnDev supports the Curricula development and will organize trainings. In SL EnDev supports the national and provincial youth organisations to implement a large Employment Promotion Program, which is coordinated with the national TVET. UNDP, MoH and WHH have asked EnDev to assist to stir a solar maintenance approach in the health sector, where UNDP is using former EnDev staff as coordinator. In Sierra Leone, for 4 county Governments use EnDev to equip county and municipal administrative buildings with solar systems as part of a 20 million USD project.

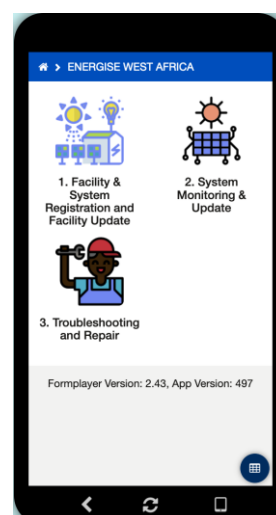
Other Nexuses from energy goes into the environmental side, to climate change issues (Fridays for Future Demonstration), pollution through battery waste and waste disposal, impact on sea, air and noise pollution from traffic and its health effects; into agriculture, with energy efficiency and its productive implication in the food, fruit and flower sectors - as well, solar water pumps and food preservation and storage through cooling and EndeV's solar dryers. Our coordination and communication activities with several baseline studies on scaring deforestation, resulting water shortage, mangrove, biodiversity loss and close links to reforestation and protected areas activities; tree planting with youth and women groups; as well, it encourages rainwater reuse, protection and solar drinking water preparation. All the above have relevant income and employment implications. Some mini grids reach with welding, sewing, sawing and ice making already other productive uses in the manufacturing field, going beyond increasingly common and popular cooling, battery and phone charging activities, with particularly women taking the lead here.

## 1.9.5 Modalities

### Strengthen Stakeholders with Technical Expertise and Logistics

#### Approach

To contribute towards increased sustainable access to renewable electricity and improved cook stoves, EnDev collaborates with partners to fill existing local gaps of technical and management expertise. EnDev advises, trains, and supports local stakeholders based on needs and demand, oriented towards results. The aims are to 1.) Strengthen expertise of local professionals working in RE or ICS value chains, 2.) Support procedures towards effectiveness, high quality of and increased trust in solar technologies and ICSs, 3.)



contribute to sustained solar electricity in social and environmental institutions or mini grids. EnDev supports and works towards specialized and more formalized higher quality trainings at Technical and Vocational Education and Training (TVET) institutions and universities. To increase access to high quality teachings, EnDev has started to develop e-learning tools, which include a smartphone app and an e-learning platform tailored to the specific needs of the region and the situation based on our long-standing analysis of educational needs and conditions of the stakeholders. The app and the platform are in beta-phase and will be handed over to national partners. The digital tools can (partly) also be used offline. If entities from private and public sector ask EnDev for specific technical advice, the first choice is to connect with/involve (other) local partners and the private sector. If this is not feasible, we strive to collaborate, teach and train while assisting and securing the quality, e.g. conducting ToTs or trainings for technical staff or other stakeholders. Furthermore, EnDev collaborates with partners and supports participation of other trainings in and outside of Mano River region, as soon as the Covid travel restrictions are over<sup>44</sup>. Specific attention is given on increasing means to strengthen female professionals in the sector. This is done in collaboration with GTI, FLS, WIRE but as well private sector, NGOs and UN organisations.

### **Activities**

EnDev carries out training courses and events for local professionals, students and practitioners dealing with RE technologies. Typical participants are private sector retailers or installers (pico-PV, PAYGO, SHS, complex solar systems, ICS) or ICS producers, electricians, mini-Grid designers, operators and installers to staff/technicians from the public sector (e.g., for monitoring, maintenance, repair of solar systems.) EnDev actively supports the development, validation, application, and adaptation of RE curricula. Upon specific requests of partners, EnDev provides assistance and training regarding different technical and management aspects of using improved cook stoves, solar thermal energy systems and electric productive appliances (solar pumps, water purifiers, phone and battery charging stations, refrigerators etc.). EnDev is strongly involved in the planning and implementation of SI solar electrification and collaborates with stakeholders to design, register, monitor, optimize, support and troubleshoot solar systems on the ground or with the solar hotline. Other trainings and advice support mini-grid operations, operators, their start-up, measuring and monitoring, grounding, medium voltage grids, transformers, as well as quality controls. Furthermore, EnDev supports trainings for last mile grid connection, low and medium voltage, including transformers, supporting testing and piloting of institutional improved cook stoves.

### **Reasons for Approach**

The number of qualified RE companies and professionals in the Mano River countries is low. Digital knowledge, skills and resources are lacking to access international e-learning possibilities. EnDev strives to optimally strengthen local stakeholders and filling these gaps, addressing this low expertise barrier to increase high quality RE products and services and their sustainability. EnDev builds on previous work, trustworthiness, reliability, planning and logistical strengths and flexibility to come in fast when needed, qualities which are urgently needed to increase confidence in growing RE investments. EnDev builds on strong technical

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<sup>44</sup> We secure partner trainings as well outside Mano River in Cape Verde, India, South Africa, Kenya, Nigeria, China, Germany a. o. mostly financed by and for partner organizations and staff from Liberia, Guinea and Sierra Leone

RE expertise, with over 1,000 SI solar installations as post-Ebola support donations or in collaboration with many different partners (Welthungerhilfe, We Care Solar, Ministry of Health, NGOs, UNDP, EU, USAID, KfW, others) and support resulting in 14.000 ICS sold. Many students, in particular the female ones cannot pay the school fees. So the schooling system is segregating socially and discriminating the poor. By making know-how available for those who cannot afford schools, books and examens, we open the doors for all who want to learn and progress and have the necessary perseverance whether poor, women, old or far away. The bottleneck is internet access, but we make E-learning instruments available off-grid and help with internet to overcome this paralyzing social and gender gap.

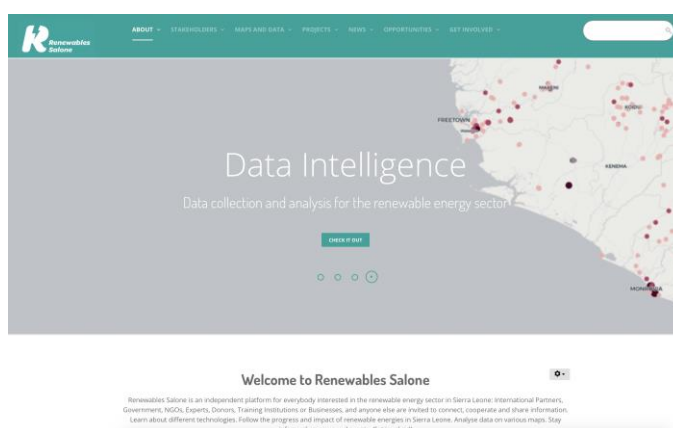
### Effectiveness and Cost-efficiency

The more the local expertise grows, the more EnDev shifts its focus towards strengthening technical skills and performance of local solar professionals and companies, to institutionalize, formalize and register solar qualifications and contribute towards ensuring solar installation, without discriminating those who learn elsewhere (joint examens). In this way we leverage our technical experience in ways that optimize quality of results, maximize output, and minimize our input. We collaborate in small steps, so that we can see what works, learn from past failures, and scale only if we have made good experience. EnDev increases its efficiency and sustainability by collaborating and combining practical work with trainings, testing, measurements, troubleshooting and demonstration. EnDev always includes a strong hands-on portion with tools in learning and training. If necessary, EnDev assists as well with storage, spare parts, transport, planning, tools, instruments, import.

### Enable information sharing and networking

#### Approach

EnDev addresses the lack of knowledge, transparency, accountability, and awareness about RE and ICS, to help public, private and NGO stakeholders to collaborate and create synergies towards mature markets and enabling environment. EnDev provides all actors with improved transparency mechanisms and digital instruments for RE and ICS market stimulation. The strategy is that improved access to information as well as a digital active stakeholder community helps to move from (politically) abstract electrification goals to concrete action. Transparency mechanisms define and prioritise concrete measures and identify the associated time and resource requirements. Improved analytical data driven tools enable the private sector to effectively steer its actions towards achieving the policy objectives. EnDev aims to 1.) Facilitate data and information collection, dissemination and sharing (offline and online); 2.) Contribute towards RE awareness, learning and knowledge among decision-makers and users of energy systems 3.) Connect RE and ICT stakeholders for networking, coordination, cooperation and the creation of synergies. This responsible broker role with an overview and detail information on the sector in each country



is appreciated but also challenging. EnDev promotes transparency in countries with corruption problems, failing projects and a culture of treating public information and studies like personal property to be kept enclosed. Here, EnDev is careful and patient. We collaborate, co-organize sector meetings, promote informal exchange and digital tools. EnDev has developed and further develops, expands and refines **ICT4Renewables** in all three countries, a high-quality and highly flexible powerful open-source digital toolbox with mobile app for offline data collection, data cloud, mapping tool for information visualization, web portals and active social media channels<sup>45</sup>, e-learning platform and app. These tools can be used for marketing, learning, networking, monitoring and maintenance. We work with three multi-stakeholder groups (Liberia, Sierra, Guinea) to take over these tools and information brokering activities.

### Activities

EnDev advises, co-organizes meetings, exhibits, trains and provides information on RE and ICT, stakeholders, opportunities and news. 1.) For data and information collection and sharing, EnDev provides the ICT4Renewables apps to partners that can for instance register and monitor solar installations and their technical and general specifications. EnDev offers stakeholders to share their information, which is then made available in meetings, on the web portals and social media channels, some data are visualized with the mapping tool. Additional news, opportunities and relevant information is proactively searched, published and shared with stakeholders. 2.) To contribute towards awareness, learning and knowledge, EnDev advises and informs about national or international learning opportunities, RE options, training and e-learning opportunities and support outreach activities, creating radio broadcasts or videos for awareness etc. EnDev also provides IT supported advanced, specialized and basic trainings, e.g., Solar technology knowledge for private sector groups of solar installers, trainers, or ICS producers, of engineers/architects (LAA), and construction contractors (LACC), mini-grid operators, Governments, NGOs and donors. Via sector associations and Ministry of Commerce and Industry EnDev can also reach small and medium enterprises to inform them about RE options and encourage productive use. We advise regulators and Ministries on data management options, strategic and legal issues, safe data storage with RE and how to support or make better use of RE and ICS. Since EnDev demonstrates and tests new techniques on some of its own compounds and demonstrates many technical RE, ICS and environmental friendly solutions, it has become as well exhibition (and training) centre for many different stakeholders, e.g. a group of female high school students who wish to increase climate change awareness in their communities could learn, touch and discuss the different renewable energy technologies at EnDev office. 3.) For networking, coordinating, and creating synergies EnDev participates in high level Rural Electrification groups and conferences, co-organizes stakeholder meetings, ensure updating of the web portals and broader involvement, and plans to expand the ICT4Renewables toolbox with a virtual market place for RE professionals, (potential) clients and investors. Often stakeholder approach EnDev with specific requests, and we help them to find reliable private sector companies, financial support or the necessary institutional or technical information. Companies coming from other countries, may take EnDev compound to do the first steps. EnDev encourages

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<sup>45</sup> See: [www.renewables-liberia.info](http://www.renewables-liberia.info), [www.renewables-salome.info](http://www.renewables-salome.info), Facebook Renewables Liberia, twitter: Renewables Liberia

stakeholders to also share and reflect on failures or mistakes in ways that avoid blaming and shaming but leads towards learning and improvement.

### Reasons for Approach

Lack of data, knowledge, exchange, coordination, "Silo culture" with hidden expertise often makes it difficult for stakeholders to plan relevant, sustainable RE activities. EnDev's digital strategy address mainly these three needs:

1. **Need for coordination:** Highlighting overlaps, gaps, synergies and opportunities for collaboration even if the effect is limited.
2. **Need for planning:** Easing the strategic and socio-economic planning of the RE sector, as well as the planning of future activities, programs and investment.
3. **Need for information:** Providing comprehensive and transparent information about existing activities and development of the sector to development partners, policy makers, civil society, research institutions and the general public.

Government agencies struggle to fulfil their mandates to support and coordinate RE activities, so EnDev collaborates with them to include not only donors and NGOs, but also private sector entities, and introduced digital tools. EnDev is experienced and well positioned to provide and spread relevant sector information in the three countries, as well from a regional perspective and with regional synergies (with about 50 cross-border activities, institutions, companies) and to encourage improving collaboration of heterogeneous stakeholders on different levels. These activities contribute to create or strengthen sufficient-sized markets for persons, companies, products, tenders, lenders and projects but as well to have institutions benefit from activities, knowhow, companies, experts in neighbouring countries or counties. Information allows competition, prices become more reasonable, bogus products are easier disqualified. EnDev is an information broker and thus approached by any stakeholder or person relevant to the sector from any level, as well for institutions, companies and programs to present themselves.

### Effectiveness and Cost-efficiency.

With relatively modest financial and staffing support, EndeDev realizes considerable effect, when EndeDev demonstrates new components, applications, help to keep or get systems running, spread information, connect stakeholders and help to secure logistics, plan, implement, catalyze, finance, encourage and monitor relevant RE projects. Digital tools, in combination with face-to-face meetings, keep costs reasonable and allow wide-spread availability of information and manpower. The ICT tools are a mirror and a history book for the sector, the living institutional memory that cannot be easily hidden, monopolized or deleted.

## Advocate for Sustainability

### Approach

Achieving a high level of sustainability in the RE sector is closely linked to general awareness regarding the various aspects of sustainability in the society. Therefore, EndeDev does not only supports discussions and actions on sustainability in the energy sector but also in other sectors. Thus, EndeDev is involved in all three countries in public debates on proper management and maintenance of installations, but also on recycling of waste, climate



change, biodiversity, protection of the environment, gender equality in different sectors. In addition to support mainstreaming sustainability in the society<sup>46</sup>, EnDev specifically aims for: 1.) Solar technological sustainability; 2.) Financial and institutional sustainability and moves towards more gender equality in RE sector; 3.) Environmental and social sustainability including climate change awareness, and reduced deforestation.

## **Activities**

1.) Sustainability of solar energy access in public facilities: EnDev collaborates with the Ministries of Health, Ministry of Energy, the Solar Associations, WHH, UNDP, We Care Solar, GIZ and others to establish a maintenance and repair systems with clear responsibilities and sufficient funding for clinics and hospitals. This includes standardized maintenance manuals and ICT4Renewables App, creation of a maintenance and repair fund and a specific maintenance association, and a hotline for solar system monitoring, maintenance and repair. We start to root routines, procedures, checks and balances into a nationally implemented approach. We support educational institutions for solar technicians with training, targeted financial support and practical repair excursions to social institutions and to build capacities for formalized high-quality teaching. In cooperation with the GIZ Health Projects in three countries, EnDev trains biomedical technicians and other technical staff in maintenance of solar systems. 2.) Sustainability within the RE markets: EnDev continues to support the relevant professional associations (REASL, LEAP, APER), for instance to help with office or meeting space, awareness campaigns, trainings or other activities for which they request support. A contribution to sustainability is also our focus to strengthen female involvement and organisations, e.g. EnDev had offered a leadership training (u.lab) for female RE professionals which resulted in their decision to become an organisation which is now registered as Women in Renewable Energy (WiRE) Liberia, recently a group was formed as well in Sierra Leone. Now EnDev collaborates with WiRE in their activities for empowering women, finding sustainable activities and increasing environmental and RE awareness. We work on regional synergy potentials with Mano River Union, ECREE, ECOWAS, AfDB, WB, IRENA and with TVET institutions/Universities on RE curricula and to maintain regional approach between Mano River Governments (MRU conference I, Preparation for MRU II). EnDev also assists in identifying finance for the private sector, or private sector partners for financing schemes / investors. EnDev encourages ways for the markets to shift from a donor driven market towards an increasingly through private demand driven market, to a large extent for private homes and business. 3.) EnDev collaborates and uses opportunities for sustainability outreach, starting with own staff and green offices (soon embassies) as models (also facilitating the GIZ Corporate Sustainability Handprint in Liberia), events with RE quiz and solar cinema, campaigns and other forms of advocacy in Government institutions and within society. For example, information material and trainings about kitchen design and behavioural change for reduced health impacts of firewood; change messaging towards social and environmental sustainability; this includes empowering women, reducing violence and teenage pregnancies, reduce plastic and battery waste (including preparation for a reshipment of used lead batteries), sustainable gardening and agroforestry are synergies, with effects as well in the remotest areas.

## **Reasons for Approach**

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<sup>46</sup> EnDev also leads the Corporate Sustainability Handprint Working Group for all GIZ projects in Liberia



In Mano River Countries, many people must focus on surviving and satisfying their short-term basic needs (food, health, shelter, education, work, safety) to sustain themselves, mostly just to survive. The economic situation is worsening limiting market development. The populations in the three countries are very young. Traumatic experiences and narrowed focus during the civil wars (“War mentality”), Ebola and now COVID (Lock-up and curfew experience) have shaped a whole generation and disrupted rudimentary traditions and attitudes of caring for land, others and the environment. At the same time, environmental degradation, pollution, exploitation, and deforestation (including the rain forests) advance at a fearsome and suicidal pace. Solar energy access is only sustainable with proper monitoring, maintenance and repairs and within a broader maintenance, sustainability and responsibility concept. It needs more than technical understanding. Air pollution and health impacts from thousands of generators and cooking with wood or charcoal are not sufficiently known, even though resulting health problems are severe, with many thousands of deaths annually from lung problems. We use our position to advocate for RE technology maintenance, stable regional RE markets, awareness about climate, water, soil and other impacts and needed behaviour (change) to sustain health and environment. Activities are implemented, discussed and agreed upon jointly with our partners and national staff, to remain realistic. As well, we have started to position some of our staff in other institutions, to further stabilize and spread understanding, vision, and strategy. With Post-Ebola and COVID donations, EnDev has installed many solar systems in health facilities and schools and contributed actively to a strong institutional cooperation network to enhance aid effectiveness and sustainability of installations. The engagement with the health sector (to a lesser but growing extend with schools) continues with a broad range of partners and provides a basis for reaching multipliers. EnDev is patient, persistent and optimistic and engage in discussion and collaboration with these stakeholders to ensure local ownership and sustainability.

### **Effectiveness and Cost-efficiency**

EnDev is visible and well respected in the countries of operation. Putting the different dimensions of sustainability as clear targets on our agenda allows EnDev to communicate that measures to strengthen sustainability in the RE sector are closely linked to a general higher awareness about sustainability aspects. EnDev’s sustainability activities for health centers and other public institutions serve as models and to strengthen our role in the public debate. Thus, EnDev can create practical examples that can be transferred to other sectors with only few resources. Behavioural change messaging is crucial for development and long term technical, economic and social sustainability.

## **Incubate RE Innovation**

### **Approach**

Innovative approaches and pilots towards RE access and (productive or social) use can bear fruits and be effective if supported and nurtured in the early stages. EnDev supports local stakeholders to identify, test, pilot and use promising new technologies and ideas. It also initiates discussions about these new technologies and ideas and distributes information about experiences offline and online, and where to get further financial and business support.

### **Activities**

Building on existing and new collaboration partnerships, we enable various innovative ideas to develop. For instance, building on a good example at ELWA clinic, we have tested and show-cased passive energy (greening of buildings) on our own compound to reduce ventilation and AC needs and introduce and/or produce important but insufficiently known fruit, staple and wood trees or plants. We have further promoted solar e-mobility with electric bicycles (test ride from Liberia to Sierra Leone), motor cycles, tuk-tuks; solar charging stations to reduce cost, time and pollution<sup>47</sup>, and encouraged NGOs and private sector partners to explore and invest in e-mobility (crowd funding, test of business models in cooperation with mobile Power - mopo). We support mini-grid operators to establish new tariff systems which include a social tariff for low power consumption and to install the necessary hard- and software by supporting long-term follow-up on metering and tariffs in a mini-grid (Segbwema, Master Thesis). For larger systems we have introduced different fuel saving measures to have a cost-efficient reduction of diesel needs, and silicon batteries to secure a longer lifetime and Zimpertec batteries for measuring and equalisation of cell tension to increase durability as well. We provide quality advice, data measuring and energy logging, and if needed installation assistance and sometimes often assist to organize and encourage financing of large solar systems for schools, universities, supermarkets, hospitals, hotels, gas stations, UN buildings, cell phone towers etc., which are new to the companies and operators; this is to increase the size of the market, demonstrate and show viability and turn renewables mainstream, visible and economically attractive.

We support business models to generate income with RE, especially for women and young people, creation of new business by professionals and their expansion into neighbouring Mano River countries.

### **Reasons for Approach**

Rapid RE technology developments and a challenging environment lead to the need to explore new technologies, new modes of project implementation, new strategies and other applications, business models, improvement to speed up, change, roll-out, mainstream and accelerate understanding. Our flexible demand-driven approach, where EnDev takes over different roles (information broker, advisor, pilot financier), allows entrepreneurs and companies to explore new approaches and technologies jointly with us. Where relevant funding becomes available for the private sector (as is presently the case in Liberia), we give advice, how to use it best, but help as well to link those companies to assist each other. Our position among the stakeholders allows us to test and move forward on those venues that seem promising, some help with identification and motivation for a viable sustainability approach.

### **Effectiveness and Cost-efficiency**

Collaborating closely with other actors who also want to explore innovations and generate income, mitigates the risk of moving into unrealistic directions here or creating dependencies or dysfunctional businesses by supporting those who lack entrepreneurial skills. We are aware of our limited resources for this small component of our work and thus select those

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<sup>47</sup> EnDev solar office allows charging/fueling free of charge. Among the first 20 e-bikes sold in Liberia, EnDev has piloted 4, one as office bike, one donated to the Rural and Renewable Energy Agency, with the Minister of Energy test riding it: [www.renewables-liberia.info/index.php/category-blog/252-the-first-e-bicycles-in-liberia-tested-by-his-hon-minister-murray](http://www.renewables-liberia.info/index.php/category-blog/252-the-first-e-bicycles-in-liberia-tested-by-his-hon-minister-murray) .and one of the two private bikes from EnDev staff went successfully on 14-day tour from Monrovia to Sierra Leone and back.

projects that seem to have high potential, relevant impact and allow us to keep our input minimal (high efficiency). First movers, change agents and dream sellers are needed in Mano River to give hope, demonstrate venue and open rooms for a sustainable future.

## 1.9.6 Results

### Quantitative Results

In all areas of work, EnDev is closely cooperating with other organisations, so that only in few cases results can be completely attributed to EnDev. In most cases, at least one international partner has been contributing to joint activities. EnDev's share in the implementation of access projects in cooperation with others varies and ranges between 5% and 90%. We estimate that on average 20% of the results can be safely attributed to EnDev. Thus, the additional targets listed in the following table represent 20% of the overall expected results of joint projects, which are: 200.000 people with access to electricity, 50.000 people with access to modern cooking, 4.000 SI with access to electricity, 1000 SI with access to modern cooking, and 120 enterprises with access to electricity.

Project results	Achieved targets 2010- 2019	Additional targets 2021 -2023
People: Access to Electricity	65,900	40,000
People: Access to Clean Cooking	21,300	10,000
SI: Access to Electricity	2,200	800
SI: Access to Clean Cooking	960	200
PU: Access to Electricity / Mini grids	8	24

In addition, every twelve months a report will summarize the following results:

- number of meetings/events attended/organized including gender ration among participants
- number of courses/trainings institutionalized / attended/organized
- number of people (women/men) trained
- additional electricity generation capacity (kW) in the countries and counties, estimate)
- posts on Renewables web portals and social media and number of visitors of respective sites
- number of improved transport equipment (solar/electric transport)

Regarding sustainability of the interventions, EnDev will assess on a regular base:

- The technical and management capacity of public partners, companies and professional associations for RE and ICS and the role of women in these entities.
- The number and quality of monitoring data, of maintenance, repair, and replacement measures of photovoltaic installations.

- The use of established platforms on information sharing, (e-)learning and networking including ICT4Renewables by relevant stakeholders.

### **Expected impact**

If the above outcomes and outcome figures are realized at the end of 2023, typical impacts of access to modern energy would be achieved for a significant number of households, social institutions and enterprises, such as improved living conditions, higher income, better educational and health services, more gender equality etc.. EnDev will not be able to carry out many impact studies on their own. However, whenever partner organization plan these kinds of studies, EnDev will be happy to contribute to them.

In general terms, EnDev is expecting that because of the activities the market for RE technologies will develop and offer companies new possibilities to grow. Companies will work in a more favorable business environment, with active and responsive institutional contacts and have improved turnover. They are part of a qualification cluster that improves, gets trained and innovates in a regular rhythm. The share of women employed in these companies is at least at 25% and company owners are 20%. Many of them use the ICT tools offered for the sector.

Politicians will pay more attention to RE and ICS, which will be reflected in respective policy papers related to income, jobs, business development environment, climate and forest protection.

The market offers a range of renewable products from Pico PV, over Plug & Play, SHS at different sizes without size limit, fuel savers including a range of payment modes. Most products are certified, have a warranty and warranties can be used.

As well on the ICS market the range of affordable and efficient stoves has considerably increased.

Mini grids will play a relevant role as well as a product on the market, especially in rural areas and have a reputation to be reliable and improving wellbeing and energy happiness in villages and sub-urban areas. The range of productive uses here as tripled, as well the number of women involved. Some mini grids are built by private contractors without direct Government or donor subsidies.

For Social institutions the impact in terms of health, reduction of deaths, false diagnosis, living condition of health staff and operation of laboratories, including resistance tests for antibiotics and more heavy health equipment is substantial and can be quantified. As well for schools and their advancement not only of light but as well of ICT tools used is quantified. Same for other social institutions, and for all there is a maintenance, repair and replacement mechanism in place that can be used and addressed. The role of EnDev in the fight against Corona (and Ebola) is visible, known and can be quantified

## **1.9.7 Sustainability**

### **General remark on sustainability**

EnDev activities are based on close collaboration with national and international project partners. It aims at using minimal input and avoiding strong dependence on EnDev. EnDev is passing on knowledge and skills and emphasis aspects of ownership and sustainability in all activities. EnDev is aware that the national partners need time to develop their technical and management capacities. In all three countries, qualified human resources are scarce. In cases where national partners will not be able to sustain or further develop achieved structural changes and results, when the EnDev project ends, EnDev strives for continuous support to projects and national partners through other cooperating international organization. EnDev's philosophy is that cooperation must be based on mutual understanding and learning leading to more ownership, transformation and institutional sustainability.

More specifically EnDev aims at three core results:

- Strong public partners, companies, and professional associations for RE and ICS with good technical and management knowledge. Women shall play a stronger role in these stakeholders and structures shall be established with long-term potential.
- Systems are established ensuring proper and sustainable monitoring, maintenance, repair, and replacement of photovoltaic installations.
- Platform for information sharing, (e-)learning and networking including ICT4Renewables and weaving in awareness about environmental issues, health and sustainability are established in a sustainable way and used by relevant stakeholders.

## Electricity

EnDev activities focus on building up and supporting private companies and their professional associations to increase overall sustainability. Both, in Liberia and Sierra Leone, the project has supported the foundation of private sector organizations from the start. In Guinea, respective activities follow. In Liberia, the Liberia Energy Access Practitioners (LEAP) Network has been built up together with project partner Mercy Corps that implemented the EU-funded program "Light up Liberia". The organization "Women in Renewable Energy (WiRE)" Liberia was founded as result of a leadership training for women in the RE sector that EnDev had offered in 2019.

In Sierra Leone, the private sector development program Sierra Leone Opportunities for Business Action (SOBA) has supported the foundation of the Renewable Energy Association of Sierra Leone (REASL). After the closing of SOBA in August 2017, EnDev has become the main supporters of their association. EnDev hosts the secretariat of REASL and office sharing allows for intensive cooperation. A similar development can be found in Guinea. Since the foundation of the private sector associations in all three countries, several outreach activities, technical workshops and conferences were successfully held and are planned to be carried out regularly. The high visibility of the associations and the positive results of their

work shall pave the ground for getting funding from the government and international community in addition to member fees.

### **Financial sustainability**

Outreach activities, especially in the rural areas, including creative awareness campaigns (radio jingles, TV emissions, solar cinema, solar fairs, etc.) are organized together with private companies to foster market development from a pioneering phase to an expansion phase, to create competitive advantages and to reduce transport and distribution costs for solar products. It is expected that companies will invest more into the marketing in certain regions once a critical mass of clients is reached.

### **Technological sustainability**

The EnDev project has a big team of qualified local solar technicians due to its project history. During the Ebola epidemic, the team provided fully subsidised emergency support for health institutions and affected households, gained technical knowledge, and built up a network of social institutions during installations in Liberia, Sierra Leone, and Guinea. After having granted these subsidised exceptions during the time of emergency, EnDev staff now uses their experience and provides demand-driven trainings for the private sector, Government technicians and students. Increasingly, trainings are transferred and integrated into higher education institutions, including curriculum development. The development of an e-learning infrastructure with app that can mostly be used offline, but also allows remote participation in trainings, aims to increase learning opportunities with Blended Learning and e-learning. Cooperation with GIZ TVET programme (training of 8 professional solar teachers from 2 vocational training schools) and an employment approach (first professional grade, curriculum development, validation) have started. Thus, after the end of the project a significant number of qualified solar technicians will exist, which will be able to provide installation, maintenance, repair and replacement services as well as other services on a commercial base or as employees of public institutions.

Gender empowerment and mainstreaming is part of all activities and women as well as local partners are actively encouraged (and financed) not only to take part but to form the trainings, thus addressing **social sustainability** of the project results from the start.

Moreover, EnDev pays special attention to the **technological sustainability** of the access to electricity in public facilities. A monitoring, maintenance, repair and replacement system, including ICT4Renewables, a sophisticated mobile phone App to register and map solar systems and to follow up on their status has been developed and is used by EnDev team and project partners. As a next step, EnDev is in discussion with the Ministry of Health to establish maintenance procedures on a regular routine basis in health facilities, which shall be combined with various other activities such as a hotline, toolboxes, and training to biomedical engineers. To finance repairs and replacement, EnDev is exploring the feasibility of establishing a repair fund, funded by donors as well as by the government. In the private sector, EnDev has successfully connected companies with international suppliers, securing availability of hardware and spare parts.

The problem of e-waste will be addressed, both in outreach campaigns as well as in trainings. However, no farther-reaching activities are planned due to lack of resources. If EnDev

partners start activities in this field, EnDev would consider participating in e-waste initiatives within its possibilities, to contribute to **ecological sustainability**.

### **Institutional sustainability**

To ensure that the project activities strengthen the technological and management capacity of partner institutions, EnDev provides advice, training, information sharing, and networking support to key partners. In addition, EnDev is part of regular meetings with stakeholders from the private sector, government, and donors where policy issues, strategies and projects in the sector are discussed.

With several tools within the frame of the ICT4Renewables approach such as data collection apps, websites, maps, newsletters, E-Learning platform, social media channels, EnDev has paved the ground for a stronger guiding role of the public partner institutions, which have started to manage the tools. EnDev strives to further strengthen the management and the operation of the tools through a multi-stakeholder team involving key persons of different institutions.

### **Cooking**

In SL nearly all charcoal on the market is produced from traditional charcoal kilns with an energetic efficiency of about 30 %. In combination with low efficient stoves the overall efficiency of the supply chain normally is only about 10%. The high resource consumption caused by bad efficiency contributes to an ongoing deforestation. A significant increase in efficiency in the production and consumption of charcoal would not only reduce the wood consumption but would open the possibility to provide the raw material through sustainable forestry. Therefore, as long as other fuels and technologies are presently and in the short term neither available nor affordable, the charcoal production chain has to be improved. This comprises three elements: sustainable forestry, efficient charcoal production and efficient stoves and cooking techniques.

Improved cook stove energy in the Mano River Union has just grown from a pre-commercial to a pioneering phase. The main objective of the project activities is to support market development both, on the demand and on the supply side to address **financial sustainability**. In Liberia, EnDev has developed the Red Fire Pot, a locally adapted improved cook stove, and trained producers and retailers, respectively. EnDev will continue to provide marketing support in form of radio jingles, show cooking and peer-to-peer retailing with the aim to increase demand. Users will be informed about the advantages of improved cook stoves and sensitized on the negative impacts of traditional cooking systems regarding deforestation, health, environmental and gender issues. EnDev will continue to provide technological and management assistance to stove manufacturers but to a lower extent in comparison to Sierra Leone, as the potential of companies to grow is limited. The focus of market support for improved cook stoves will be on charcoal in urban areas on wood for institutional use in rural areas. In regions, where firewood is easily accessible as a low-cost fuel, introduction of improved fuelwood stoves is most promising for institutional stoves (schools, bakeries). Households will only switch to improved stoves, when these are offered at a very low price, which is currently difficult to achieve.

In Sierra Leone, activities in the cooking sector play a bigger role. The focus is on producer support, marketing, since shortly with micro-credit support and quality assurance of



improved cook stoves, including testing in a specific stove laboratory built with the help of UNDP. Consumers are usually not in a position to evaluate the quality and efficiency of the stoves. Therefore, a certification scheme for the most important stoves on the market shall be developed in cooperation with CCASL and the Government Technical Institute (GTI) in Freetown. All activities are carried out together with producers, retailers and in cooperation with project partners to ensure **institutional and social sustainability**. In addition, EnDev is often asked for technical support and advises by UNDP and other UN organisations in Sierra Leone or Mary's Meals in Liberia, and by ECOWAS or ECREE on institutional stoves, improved kitchen design and fulfilment of testing criteria or even to operate the testing lab for UNDP. To ensure **technological and ecological sustainability**, EnDev supports at this stage high quality improved cookstoves that are locally produced by manufacturers with a potential to grow and sustainable charcoal production. EnDev explores the possibility to promote cooking with gas as a means against the rapidly deteriorating deforestation and erosion situation around Freetown.

### **Exit and Handover Strategy**

EnDev strives to overcome the market barriers listed above so that markets will transition from the pioneering into the expansion and later into the maturity phase. This is most realistic for solar technologies and services and more difficult to achieve for improved cook stoves and for a sustainable value chain for charcoal. The RE sector in general will need more than three years to be fully functional. However, EnDev is prepared to close whenever decided by the donors. EnDev continuously passes on knowledge to project partners and is closely cooperating with international partners so that relevant activities that cannot be carried by national entities are taken over by international organization active in the sector. With an imminent end of the project, EnDev will support employees' transition to private enterprises or to training or governmental institutions. Hardware (vehicles, computers etc.) will be transferred to partners, associations and possibly private initiatives in close cooperation with the Government partners, above all the three Associations and Rural and Renewable Energy Association (RREA) in Liberia and the Ministries of Energy in Sierra Leone and Guinea.

## **1.9.8 Gender Strategy and Safeguards**

### **Gender strategy**

Liberia, Sierra Leone, and Guinea are still far away from gender equality. The (renewable) Energy (RE) sectors are mostly men-dominated, especially in technical jobs and often in the higher positions. Unfavorable mindsets, norms, structures, and other conditions perpetuate this inequality. EnDev's gender strategy is described in detail in the separate "EnDev Gender Strategy" document attached. This chapter summarizes key elements. EnDev's strategy has four columns, two are transformative, two are responsive.

**Strengthen women in RE sector.** EnDev dedicates time and other resources to support female RE professionals in organizing themselves, establishing structures for peer support and for attracting young women to STEM careers and the RE sector. Women in Renewable Energy (WiRE) Liberia is now a registered NGO, where EnDev had offered a leadership training for women in the sector, which resulted in their decision to organize themselves. EnDev involves and strengthens them, as well as collaborate and encourage them to reach

out, to link with female RE professionals in Sierra Leone (about 60 had received scholarships from EnDev) and possibly other countries to build upon a strong female peer support network. EnDev will continue to strengthen women in the sector with individualized career support packages, mentoring, collaborating in projects, internships, scholarships, specific trainings/ e-learning offers etc. adapted to the specific needs and requests of the women.


To **contribute towards structures for gender equality in RE**, EnDev challenges perceptions of solar technicians as men by increasing visibility of women in the sector (role models), e.g., prefer women when creating e-learning videos about RE, showcase them in news on web portal, involve them as speakers in meetings. Other possibilities include specific interventions and/or informal conversations with partner organizations as well as both men and women about highlighting and overcoming obstacles for female RE professionals, e.g., in the private sector, collaborating in projects for young women and (female) high school students that inform about RE (careers) and attract women to STEM careers. Other ways are continuing to request and promote female participation (50%) in EnDev supported trainings and activities.

To **address specific needs of women and children with RE activities, products, and services**, EnDev increases collaboration with partners and women organizations during design and implementation of interventions. For instance, supporting solar electrification of women organizations, promoting the women which are sales agents for solar products in rural areas, involving more women in refining the e-learning approach and courses and take care to tailor them to specific situation and needs of women.

**Integrating gender perspective** in all EnDev activities involves pro-actively looking at what EnDev does and ask how EnDev could change it towards contributing to more gender equality, e.g., invite women to go along on installation or repair missions, include remarks in outreach activity that highlight that it is/can be normal for a woman to install solar lights or produce improved cook stoves. This includes giving out information materials to prevent teenage pregnancy, report violence, learning opportunities, when visiting remote health facilities etc.

# 1.10 Madagascar

## 1.10.1 Summary and key data

Promoted technologies			
Summary of proposed intervention(s)	<p>ADES with financial support through EnDev contributes to further exponential growth and market development by further expanding and improving (i) its local ICS production capacities through a <b>second metal workshop, procurement of spraying equipment, and upgrading of the clay body pressing equipment</b>, and (ii) its distribution channels through the <b>establishment of seven new sales branches</b>. As a result, 58,093 stoves will be deployed sustainably until 12/2023.</p> <p>These activities will be complemented by further increasing ADES network of (mostly female) retailers, the continues use of ADES' mobile centres to distribute its stove and the continued testing and development of new, innovative stoves which enable households e.g., to use one stove for both fuels wood and charcoal. New scaling up approaches include the development of innovative pricing and financing models to reach the bottom of the income pyramid to expand the market more rapidly and to leave no one behind.</p>		
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	n/a	People	
Cooking / thermal energy for households	22,244	People	-
Electricity and/or cooking / thermal energy for social infrastructure	377	SI	-
Energy for productive use / income generation	582	MSMEs	-
Project period	01.01.2021 – 31.12.2023	Indicative Budget	EUR 667,000

## 1.10.2 Theory of change (ToC) and state of market

Across Africa, Madagascar has the largest clean cooking deficit with less than one percent using clean fuels (SEforAll, 2019: Taking Pulse Madagascar 2019). One of the biggest challenges for the market growth of clean stoves is the dependence on traditional fuel sources. Wood and charcoal are relatively cheap compared to clean fuels and are often the fuels of choice for millions of people living below the poverty line in Madagascar. Even if people are willing to spend more money on clean fuels, access to fuels such as ethanol is often too expensive, and supply is limited.

This has devastating effects on people's health. According to the WHO, 18,700 people die prematurely every year in Madagascar because of indoor air pollution. To address this problem, it is necessary to create a market for clean cooking solutions for Madagascar.

In Madagascar, 99% of the population uses firewood and charcoal for cooking, while only 1% of these households are using improved wood or charcoal stoves. Consequently, Madagascar has one of the lowest ICS adoption rates globally. This low adoption rate can be traced back to a lack of customer awareness and consumer affordability challenges. The cookstove market in Madagascar is dominated by small-scale producers producing mostly artisanal cookstoves which are neither capable to produce semi-industrial cookstoves nor have the resources to invest in customer awareness. The semi-industrial cookstoves production is still at a nascent stage and highly dependent on programmes of international organizations and NGOs such as ADES.

Madagascar is the 4th poorest country in the world, where market development is per se still at an initial stage. One third of Madagascar's inhabitants live in urban areas. The average age of the population is 19 and life expectancy is 66 years. With 2.7%, the country has a very high population growth rate. This is 729 000 people more every year. These demographics ensure demand for ICS continues to rise.

Theory of Change - EnDev Madagascar			
	Energising Lives - Social development	Energising Opportunities - Economic development	Energising Climate - Combating climate change
<b>Impacts</b>	<ul style="list-style-type: none"> <li>Poverty alleviation: improved household income through savings, reduced vulnerability</li> <li>Improved health of women and children through reduced smoke exposure</li> <li>Improved education preconditions</li> <li>Improved gender equality</li> </ul>	<ul style="list-style-type: none"> <li>Strengthened rural economic activities</li> <li>Increased SME productivity</li> <li>Increased job creation</li> </ul>	<ul style="list-style-type: none"> <li>Reduced greenhouse gas emission</li> <li>Reduced forest degradation</li> </ul>
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Private sector and public actors continue investing to expand the provision of improved cookstoves</li> <li>Households, social institutions, and restaurants continue to use and replace improved cookstoves</li> </ul>		

<b>Outcome</b>	<ul style="list-style-type: none"> <li>• Increased adoption rate of improved cookstove at household level,</li> <li>• Increased ICS adoption rate of social institutions and small businesses</li> <li>• Increased (female) employment in the production and distribution of stoves</li> <li>• Reduced Greenhouse Gas emission and deforestation</li> </ul>		
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>• Household, schools and restaurants will invest in and use improved cookstoves</li> </ul>		
<b>Outputs and results</b>	<ul style="list-style-type: none"> <li>• Increased production of ICS</li> <li>• Increased quality of ICS</li> <li>• Increased supply/ product range</li> <li>• Increased number of professionalized market actors for production, distribution, retailers, and operation and maintenance</li> <li>• Increased number of trained women working in the distribution of stoves</li> <li>• Improved customer awareness and increased demand</li> <li>• Innovative products and pricing schemes</li> </ul>		
<b>Key interventions</b> <small>*funded by EnDev, other are complementary activities by ADES</small>	<b>Business development and training</b> <ul style="list-style-type: none"> <li>• Construction of second metal workshop for ADES to reduce costs and increase production*</li> <li>• Procurement of spraying equipment and upgrading of other equipment to constantly improve product quality*</li> <li>• Further development of product range (OLI-MIX, customized institutional cooking*, solar-powered water heaters etc.)</li> <li>• Establishment of offices branches for last mile distribution*</li> <li>• Recruitment of retailers (men and women)</li> <li>• Training and support of retailers and own staff (men and women)</li> </ul> <b>Evidence and learning transfer</b> <ul style="list-style-type: none"> <li>• Data collection and analysis of willingness to pay and market potential*</li> </ul>		<b>Awareness, Affordability, Customer Relationship</b> <ul style="list-style-type: none"> <li>• Awareness raising campaigns through Mobile Sale Centres*</li> <li>• Flexible pricing schemes to leave no one behind</li> <li>• Training of women on how to use the stove</li> <li>• Providing after-sale-services</li> <li>• Gender Campaign*</li> </ul> <b>Partnerships</b> <ul style="list-style-type: none"> <li>• Cooperation and partnerships with other international and national stakeholders</li> <li>• Cooperation with other international (semi-) industrial stove supplier and producers (Burn Stove Kenya, Bionerr and Berma)</li> <li>• Exchange and support with national Government</li> </ul>
<b>Barriers</b>	<b>Supply side:</b> Limited capacity to produce at large scale, poor entrepreneurial skills and competences of small-scale producers, bad infrastructure limiting distribution of last mile	<b>Demand side:</b> Low purchasing power to afford stove and fuel, low awareness for advantages of ICS	<b>Enabling environment:</b> focus of Government on ethanol (sugarcane based)

<b>Assumptions</b>	<ul style="list-style-type: none"> <li>• Current limited capacity and financing do not permit fast development of ICS sector in Madagascar.</li> <li>• It is assumed that Madagascar will need USD 148 million of financing for enterprises and USD 217 million for affordability gap financing to help 90 percent of households afford a basic ICS (SE4All, 2019)</li> </ul>
<b>Root cause</b>	<ul style="list-style-type: none"> <li>• Supply of cookstoves is dominated by small-scale producers of artisanal stoves while semi-industrial production is still at a nascent stage.</li> <li>• Very low adoption rate of ICS compared to total potential market</li> </ul>
<b>Core problem</b>	Slow growth in access to improved cookstoves continues to have an impact on social development and health and contribute to deforestation and greenhouse gas emission in Madagascar

### 1.10.3 Transformative character

#### Market development

In Madagascar, the level of industrialisation is low, which means that there is no basis for productive, innovative, and technologically adapted production. ADES is still the only manufacturer in the formal sector who built up a semi-industrial production for ICS and sells about 50,000 cookstoves per year. ADES records large increase in sales of energy-saving stoves (wood / coal) within a decade from zero to 309,000 units (2020: 49,950). By doing this, ADES covers 4.6 percent of households in Madagascar with its stoves (without considering households with several stoves and restaurants). Quality assurance and thus maximum benefit for the end consumer have top priority at ADES. Through regional production and distribution centres, ADES guarantees innovation and constant optimisation of the production processes and product range to increase the quantity and quality of the cookstoves while conserving resources.

ADES entered **new regional markets** through three mobile promotion and sales centres partially funded by EnDev in 2017 and 2019, which not only strengthen supply but also provide training and support to retailers and raise the awareness of costumers for ICS and its environmental impact. The mobile centres are today an integral part of ADES. Distribution will be further decentralised nationwide. (7 new branches). The ADES distribution network is important for market development. To further increase cookstove sales and to raise awareness among even more people for environmentally and climate-friendly behaviour and the protection of their health, ADES relies on a growing network of locally based independent resellers and other distribution partners. These distributors sell energy-saving cookstoves in areas where ADES does not have its own centres. Therefore, ADES trains its own resellers to become qualified business partners and representatives who create trust, build sustainable customer relationships, and raise awareness of environmental issues among their target groups.

Continuous further **development of new stove types and expansion of production**: The ICS Oli XT, a stove which can be used with wood and charcoal, is in the test phase and will be further developed. Higher tier access for households through ADES will be promoted once the testing and development of new, innovative stoves is successfully completed.

**Customized institutional cooking**: The new cookstove developed by ADES consumes only 20% of the wood originally needed. In addition, the little remaining smoke is extracted in

a controlled manner through a chimney. The new cooking process allows for a gentle and faster preparation of food. The current pilot project with detailed field studies funded by EnDev will be completed in March 2021. After completion of the pilot phase (March 2021), ADES will assess the scale up potential of its approach and may provide customized institutional cooking to schools, hospitals, factories, and other businesses at larger scale.

A new partnership with Burn Stoves Kenya is planned for this year. ADES will assemble and distribute the Burn cookstoves in Madagascar which will further diversify the product range of ICS in the market.

ADES works with many partner organisations to expand production and make energy-saving cookstoves available throughout the country. As a centre of excellence for energy-saving cooking, ADES wants to make its production partners Bionerr and Berma and its sales partners, the resellers, equally successful. Knowledge and know-how are to be anchored locally and made accessible. The retailers are given a concrete idea of the values and overarching goals of ADES. They are also made familiar with the administrative requirements of ADES (exact procedure for sales registration, payment of invoices, willingness to cooperate in a broader sense, etc.). They receive information about various innovations in products and processes as well as about special promotions such as special sales.

### **Economic development**

The production of energy-saving cookstoves is part of a sustainable industrialisation of the country or part of a sustainable and viable infrastructure of Madagascar. ADES promotes the transfer of knowledge and technology. Income generated locally is to remain in Madagascar and secure the livelihoods of the local population.

The construction of the metal workshop and procurement of equipment, together with the launch of seven sales branches, benefits the growing demand for energy-saving stoves in the northern regions. Other regions will continue to benefit from the use of mobile promotion centres.

ADES employees are comprehensively trained and further qualified for their work. In addition, ADES regularly offers various internships for students and vocational students in the fields of environmental awareness, information technology, metal and woodworking and pottery. If possible, the young professionals receive a permanent position at ADES after completing their training.

Jobs are created by expanding the local production and distribution network. Households and restaurants supplied with energy-saving stoves can secure their livelihoods more sustainably thanks to income savings through efficient use of fuel.

### **Social Development**

ADES activities actively contribute to achieving the goals of the Agenda 2030: End of poverty (SDG 1), Access to affordable and clean energy (SDG 7), and climate protection measures (SDG 13). Indirect ADES contributes to SDG 3 Health and welfare, SDG 4 High-quality education, SDG 5 Gender equality, SDG 8 Decent work, SDG 12 Responsible



consumption and production, SDG 17 Partnerships, and the goal linked to biodiversity, SDG 15 Life on land.

One important pillar of ADES work is the provision of environmental education and adult education and training. Independent retailers receive training so that they become serious partners to represent ADES in a positive manner to build trust with our customers while informing them on environment subjects. In addition to that, ADES provides environmental education in schools, churches and fairs and increases environmental awareness in Madagascar.

Mobile promotion centres are not only used for the promotion of stoves but also as an educational facility. Environmental education and customer acquisition go hand in hand aiming to raise the awareness among the population towards more acceptance of environmental protection and enhance the preference for energy-saving cooking methods.

An important sustainability factor is that ADES training programs and demonstrations provide women with know-how by improving their cooking habits and, by saving on firewood costs, enable other expenditures such as school fees for children

### **Poverty alleviation**

ADES aims to make the market systems more inclusive for the poor, who often lack information or access to products. ADES makes sure that those who are currently at risk of being left behind are supported. The mobile centres play a central part in this because it reaches very remote areas for its promotions and give communities the feeling of being appreciated.

Urban households buy fuel, charcoal, and firewood. Beneficiary households that use energy-saving stoves reduce their energy costs by more than 50 percent and can use these savings to secure their livelihoods.

In rural households, where poor rural families cook with wood collected themselves, ADES wood stoves save time, which in most cases women can then use for activities other than collecting wood. Household surveys conducted by ADES during its Gold Standard report indicate that almost 600 hours a year can be saved by cooking on an ADES stove compared to a baseline stove. Indirectly, their health costs are also reduced, because women and children are exposed to less soot and toxic exhaust fumes at home. ADES thus increases the resilience of the Malagasy population. To increase evidence, ADES plans to further monitor social outcomes disaggregated by gender as of 2021.

## **1.10.4 Collaboration**

### **Sector alignment**

EnDev/ADES interventions are in line with **the national energy and climate policies** (La nouvelle Politique de l'Énergie 2015-2030/NDCs; target of 70% access to energy-efficient cookstoves by 2030). The Government of Madagascar is actively promoting ethanol as a household cooking fuel to reduce the use of firewood and charcoal. Ethanol is currently only available in limited quantities in Madagascar. The key driver of the ethanol market to date is the World Bank's Carbon Initiative for Development (Ci-Dev), a development-focused trust fund set up by the World Bank using carbon credits to help accelerate market transformation

and the adoption of clean technologies (SE4All, 2019). A meeting between ADES and the World Bank took place in 2019 to discuss how best to promote clean cooking in the country and identify areas of collaboration. The World Bank will focus its support on the promotion of ethanol as fuel for clean cooking, while ADES will continue to focus on the production of biomass cookstoves.

**Stove standardisation process:** There is still no certified ICS standard for quality, performance and customer satisfaction which could help people with the purchase decision and motivate producers to improve the performance. It is in this context that the Malagasy standard for improved cooking equipment using charcoal has been developed in July 2017, but it is until today provisional. Nevertheless, ADES cooperates with the technical committee and fulfils the requirements by far (3-year warranty, research, tests of models etc.). Stoves are being tested on a regular basis in ADES own test laboratory. ADES attends the discussion on international standards and participates in the workshop series of the Clean Cooking Alliance (CCA) started in 2020.

Since 2020 ADES is a Global Advisor to Solar Cookers International (SCI). In recent years SCI has made significant progress in regard to its position and actions around the climate crisis, most notably its participation in the last three COP conferences. ADES advises on off-setting and profits in exchange with SCI partners on behavioural change of solar cooking and training of women in Solar Food Processing.

### **Implementer base**

**Berma:** ADES cooperates with Berma, a company mainly working in the production of large stove models. From the very beginning, the company has produced the cores of the energy-saving stoves for ADES and in return received support from ADES for the buildings, the mechanical equipment and training.

**Bionerr:** The company produces one-offs and small series of stoves, mostly with chimney. Bionerr produces very elaborate stoves for biomass. They are all-purpose burners that can also burn rice husks, sawdust, and maize waste in addition to wood or charcoal.

Bionerr supported ADES in the kiln construction (Programming 2019) and research on ceramic combustion chambers and improved energy-saving stoves. ADES and Bionerr have a contractually agreed cooperation with regards to research and development of the stoves and in the production of clay cores for the OLI-c model (coal stoves) with guaranteed sales figures. The products are subjected to a quality inspection process in a separate ADES warehouse and are assembled to the final product to meet the required quality standards for certification. A possible partnership in scaling up customized institutional cooking is currently being discussed.

**Women's cooperative:** For product protection during transport, a women's cooperative produces baskets made of locally available braiding materials in which the stoves are transported in an environmentally friendly manner. The women thereby earn an additional income of EUR 12,500 per village per year (EUR 0.25 per basket). This is indeed still a small contribution, but the support is ongoing and growing with increased ADES production. Madagascar's poverty rates are exceedingly high, and according to internationally comparable estimates are the highest in the world. Using the World Bank's international poverty lines of US\$1.90 per capita per day, poverty in Madagascar is 77.8 percent.

For the pilot project on institutional cooking, ADES cooperates with the NGO Bel Avenir. The project “customized institutional cooking” is implemented at Bel Avenir schools and equips school canteens with energy-saving stoves. The NGO Bel Avenir is an international NGO working in Madagascar focusing on social projects on the topic of "Education as a motor of development". Bel Avenir and ADES have been working together in numerous projects for many years.

ADES works closely with regional and local authorities, traditional dignitaries, schools, and various grassroots groups (e.g., women's groups, church groups and farmers' cooperatives) in raising awareness and disseminating stoves. **WWF Madagascar, Welthungerhilfe (WHH) Germany and many other Malagasy and international non-governmental organizations** that implement environmental and promotional projects also participate in the distribution of several thousand ADES stoves per year.

**Conservation and research programs** are great supporters of ADES work and long-standing project partners. Amongst them are the *Lemur Conservation Foundation* (supports the distribution of at least 500 ICS per year), *Duke Lemur, Zurich Zoo, Eden Reforestation Projects* (which ordered 10,000 ICS for 2021), *World Conservation Society* (500 ICS ordered) and *Zazamalala* (100 solar cook stoves) with whom ADES is implementing joint projects.

ADES join forces with **HERi Kiosk** and **Don Bosco Technical School**, to empower people to generate additional income. **HERi Kiosk** for instance trains kiosk owner to become retailers of ADES stoves which helps kiosk owners to generate additional revenues. At its wood-working workshop, ADES regularly trains trainees of the Don Bosco Technical School

ADES is intensifying its cooperation with **Solar Stoves International** and has been nominated as a global consultant for similar projects worldwide. Ideas from India like laundry stalls and ironing and washing on parabolic stoves which could generate an income for many women will be followed up on.

A cooperation with Burn Stoves Kenya is planned for 2021. ADES will assemble and distribute the ICS for Burns. Since their ICS are made of metal, several certified persons will be running repair centres on different locations in Madagascar.

## Leverage

The ICS market has long been a niche market but is attracting more and more attention. Carbon markets are giving the clean cooking market a huge boost, which private investors are also taking advantage of. Investors are increasingly interested in ADES' distribution, business models and how ADES brings the product to costumers. Several private companies want to offset directly with ADES or start new Gold Standard projects. Myclimate expressed the increased demand from clients wanting specific projects focussing on insetting.

ADES finances (apart from EnDev's contributions) large parts of its subsidized ICS sales through the carbon financing mechanism (Gold Standard; roughly 1,5 million €/year); negotiations with international carbon finance certificate broker organisation and contracts for the ADES project is secured through Gold Standard certification until 2028.

New sales markets for ICS throughout the country are being opened by new sales branches. The sales network will be expanded by the existing cooperatives, new retailers and businesses.

## **Nexuses**

Reforestation approach: For years, ADES has focused on reforestation and on the promise to plant one tree per solar or energy-saving stove sold. As of 2021, ADES will increase its promise and plant two trees per stove sold in the medium term. The most important principles are that in addition to eucalyptus and acacia, ADES relies on indigenous trees such as ebony, rosewood, moringa, baobab, etc. Whenever possible, the project managers also test trees that produce fruit or nutritious leaves. ADES only supports the reforestation of mixed forests consisting of hardwood, felled wood and fruit wood and does not accept monocultures.

- The forests are owned by the village communities or partners.
- Through networks and forestry experiments, all participants learn and try to anchor this knowledge at different levels.
- Partner organisations and their employees cooking on ADES stoves.

Brainstorming on new ideas and new concepts being developed on strengthening communities in selling cash crops which will also consider the use of technologies for productive use of energy for agro-processing are foreseen for 2021. The village communities should also be able to earn money with the afforestation, thus combining poverty reduction with nature conservation. First ideas are: Nuts, castor oil, honey, wax, fruit and vegetable drying, and reforestation against road construction (for example road in the deep south). This nexus activity also provides the opportunity to engage and empower women in different activities and to create ownership.

In the field of environmental education, the project "Protection and sustainable use of natural resources" of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, based in Antananarivo, which is active in the regions of Diana, Boeny, Atsimo-Andrefana and Analamanga, is also being sought. GIZ withdrew from the regions Atsimo-Andrefana and Diana at the end of June 2020.

### **1.10.5 Modalities**

#### **Approach**

With financial support from EnDev, ADES is planning to expand and improve its production and sales capacities in and around the existing ADES production and sales centre in Fianarantsoa to further increase its outreach and meet the demand for high quality products.

With the second kiln built in 2020 in Fianarantsoa partially funded by EnDev, ADES ensures a production up to a 100,000 ICS per year. For this ambitious plan, the production facility of the metal bucket in Tuléar, where the metal buckets are currently produced will however not suffice. Therefore, a second metal workshop in and procurement of spraying equipment for

Antananarivo is planned for the proposed project which will keep transportation costs low and reduced the production price of the stove.

ADES' two production centres in Tuléar (metal work and development) and in Fianarantsoa (clay distillery, paint shop, final assembly) are located in the South of the country, but the majority of its products are sold in the northern half of Madagascar. Since July 2019, ADES maintains a sales branch in Antsiranana in the far North of the country. The branch is smaller than an ADES centre and most cost effective with only one employee and a simple storage facility to support ADES retailers. ADES is planning to expand its market through the creation of **seven new sales branches** to expand and support the growing network of retailers.

## Activities

### Metal workshop expansion & repairs

By constructing a second metal workshop in Antananarivo complemented by the procurement of spraying and other equipment, the production of ICS will become more ecological and economical, as well as much more efficient.

To maintain and constantly improve the quality of the stoves the project plans also to upgrade its extrusion press and its clay body pressing equipment in Fianarantsoa.

#### ADES planned stove and metal bucket production until 2030 (in 1000)

Production clay	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ADES	35	42	45	48	51	54	57	60	64	67
Berma	5	5.5	6	6.5	7	7.5	8	8	8	8
Bionerr	20	22	23	23	24	24	25	25	25	25
	<b>60</b>	<b>69.5</b>	<b>74</b>	<b>77.5</b>	<b>82</b>	<b>85.5</b>	<b>90</b>	<b>93</b>	<b>97</b>	<b>100</b>

Bucket production	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ADES Toliara	52	52	52	52	52	52	52	52	52	52
ADES Antananarivo (new)	8	17.5	22	25.5	30	33.5	38	41	45	48
	<b>60</b>	<b>69.5</b>	<b>74</b>	<b>77.5</b>	<b>82</b>	<b>85.5</b>	<b>90</b>	<b>93</b>	<b>97</b>	<b>100</b>

Sales - medium-term planning	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	52	56	61	66	70	75	80	85	90	95

### Expansion of market through sales branches

An ADES sales branch in Antsiranana was initially set up for one year but proved to be very effective and cost-efficient and with the added value of providing valuable market insights. The example shows that it is possible to operate without a vehicle as most sales are made through retailers. Therefore, ADES would like to propose seven new branch offices with a storage capacity from 1,000 to 2,000 ICS and managed by two employees.

The choice of location for the seven new planned sales points plays a decisive role. Therefore, Toamasina is proposed as a new location (major harbour in Madagascar on the East coast), Antalaha (Vanilla Region in the North), Vohémar (strategically important in the North

East), Taolagnaro (large city in the South), Betroka (strategically important in the mid-South), Ejeda (deep South) and Farafangana in the southeast. Premises will be rented, allowing ADES to close the offices in case of low performance.

### **Reasons for Approach**

To keep pace with the expected population growth and to meet the growing demand for high quality cookstoves, supply and affordability of cookstoves must be ensured. The benchmarks of 70,000 stoves in 2025 and the final target of 100,000 stoves in 2030 are binding ADES targets. To meet the stove production target, a second metal production and spraying plant in Antananarivo is needed which will also reduce transport costs to the North.

For this reason, ADES plans to expand and improve its production, reduce its transportation costs, and expand its distribution channels. Sales branches with storing facilities will make it possible to extend the market area to meet the growing demand and to keep it constantly high, to raise awareness on the necessity of resource protection and efficiency and to stress the associated cost savings of the ADES stoves.

### **Effectiveness and Cost-efficiency**

The new metal workshop and the upgrading of the equipment will help ADES to meet its sales targets until 2030 (balance between production and sales) and save transport costs to the north of the country.

ADES sales branches are a cost-effective option. They can be run with two people only (lower recurring salary costs, less office space), do not need a vehicle owned by ADES with driver (hiring of third-party transport services according to actual needs), help ADES to reach customers far away from current stationary centres (lower mission costs), can reach high sales figures thanks to the build-up of a network of independent retailers (more efficient distribution infrastructure), and can be closed more easily if the business environment deteriorates (lower business risk).

## 1.10.6 Results

Project results	Target achievement 12/2020	Target achievement 12/2023	Additional (2020-2023)
People: Access to Cooking	152,036	174,280	22,244
SI: Access to Cooking Social institutions	186	563	377
PU: Access to Cooking	352	934	582

Further information on PUE target:

Country	Access technology	Sector	Type of economic activity	Appliance	Company size	Share of employees	Led by women	Led by couple	Target #SME
Madagascar	Stoves	Accommodation and food service activities	Food and beverage service activities	cooking	1-4 employees	30% women	30%	50%	582

## 1.10.7 Sustainability

### Financial sustainability

The operation of the expanded production and distribution centre (incl. mobile centres) will be financially secured even after the support of EnDev. For the last two years, EnDev's financial contribution was less than 10% of ADES annual turnover. ADES financial income consists of private and institutional donations (57%), CO2 certification (43%) and from revenue generated through the sales of the energy-saving cookstoves. (Full costs of an ICS are USD 50 and sales price in Madagascar depending on the model are approx. USD 5). The share of sale revenue in total volume will be successively increased. To increase the share of sale revenues in total volume is a process that requires time and depends on Madagascar's economic growth. Thus, ADES is and will remain dependent on funding contributions. Despite discounts, ADES cookstoves are positioned in the upper price segment and do not exert any competitive pressure on the simpler devices offered on the market. In view of the high poverty level in Madagascar, the income generated locally should also remain in Madagascar and preserve the livelihoods of the local population. The value of the energy-saving cookstoves produced in the country contributes to Madagascar's national gross domestic product.

### Institutional sustainability

The project is part of the ADES semi-industrial programme in Madagascar. ADES is locally registered and operates with a long-term perspective. The production of energy-saving stoves is part of a sustainable industrialisation of the country and of a sustainable and viable



infrastructure. ADES promotes the transfer of knowledge and technology and improves education and capacities to mitigate the consequences of climate change.

### **Ecological sustainability**

As an island, Madagascar suffers particularly from the consequences of climate change (shorter rainy seasons, increased cyclones, and hurricanes). Approximately 400,000 hectares of forest disappear every year, mainly due to the need for wood fuel. Increasing desertification is the result. Therefore ADES - also through this project - is committed to preserving the country's forests, which also play an important role in the global regulation of CO<sub>2</sub> emissions. Each cookstove sold and used saves three tons of wood per year, thus protecting the country's forests and biodiversity. In 2020 ADES prevented 682,321 tons of CO<sub>2</sub> emissions, this is a total of 3,525,344 tons of CO<sub>2</sub> in the past decade (2010-2020) (Gold Standard).

Environmental impact of large-scale stove production (potential sources of waste when up-scaling production) would be limited to waste from mechanical equipment, as well as paint rests or cleaning solvents from the use of paint sprayers.

### **Technological sustainability**

80 % of the stoves are still in use after 5 years (Gold Standard). ADES has currently 176 permanent employees, and it supports additional 143 local suppliers and 175 retailers. Employees are comprehensively trained and further skilled for their work.

Quality assurance and therefore maximum benefit for the end consumer are top priorities at ADES. Through regional production and distribution centres, ADES provides outstanding support service and delivers the best delivery service permitted by the state of the local road infrastructure. Product innovation and continuous optimisation and expansion of production processes are increasingly offering suppliers the opportunity to do fair business with the reliable partner ADES.

With its focus on resource-conserving production and ambitious quality targets that are adapted to local conditions ADES sets an example that is readily adapted. In this way, ADES indirectly promotes local entrepreneurship.

### **Exit & handover strategy**

In Madagascar which is one of the four poorest countries in the world (World Bank), 90% of the population lives with less than two USD per day available for their living expenses. Under such conditions, improved cookstoves at market conditions will not be affordable for most of the population.

ADES compensates for the price gap for the quality cookstoves via carbon trade, through a long-term contract with my climate (current contract valid until 2028). Each ICS reduces CO<sub>2</sub> emissions by three tons per stove per year on average, as established independently by the auditors commissioned by myclimate and Gold Standard. ADES sells the compensation certificates on the international CO<sub>2</sub> market to generate revenues which are reinvested to make ICS more affordable in Madagascar.

Without this compensation most of the population could not afford the ICS. It is thus not foreseen in near future to adjust the sales price in a way that it could cover expenses for production and supply. Despite this, ADES is opening the price strategy with the aim to close the price gap in future.

The ADES board meets regularly for strategic sessions and established a medium-term financial plan.

ADES clearly stands for a financial commitment in Madagascar and sends a clear signal here: In view of the high level of poverty in Madagascar, income generated locally should also remain in Madagascar and preserve the livelihoods of the local population. ADES sees itself as an integrative, integral part of Madagascar's industrial culture.

### **1.10.8 Gender Strategy and Safeguards**

Access to improved cookstoves are particularly beneficial for women, who are over-represented in the kitchen (59%). Energy-saving stoves significantly improve working conditions and safety. Women are protected from inhaling toxic fumes, and stoves give off less heat to the stove than traditional cooking methods, which have a high heat load.

Disaggregated access rates by gender show that male headed households have similar access to ICS than female headed households. It is rather household income than gender that drives access disparity in Madagascar.

In all ADES centres solar and energy-saving cookstoves are being sold and repaired, interested parties advised, users trained, and environmental education for primary schools offered. In 2021, 20 additional jobs will be added. ADES animation and training programs and demonstrations are used in all ADES activities and we encourage our partners to use ICS. Activities on all awareness campaigns are reported annually and will be segregated by men and women from 2021 onwards.

Within ADES the promotion of women is taken very seriously. Nearly 70% of the management of the sales centres is done by women. More than 50% of the retailers are also women. In addition, women are engaged as basket weavers they also receive an additional income. Further gender-specific effects are to be presented in a gender analysis and recommendations are summarized below:

#### Planned actions for 2021:

with the aim to anchor gender within ADES:

- Development of a gender plan
- Appointment of a gender representative (in Switzerland and Madagascar), including description of tasks and necessary resources (time and finances).
- Implementation of a gender training for the gender representatives
- Conduct gender training for employees, differentiated according to the level of education.
- Work more closely with the GIZ gender focal point in Madagascar and (if possible) participate in meetings.

with the aim to anchor gender in project monitoring



- Development of a questionnaire for monitoring that takes gender aspects into account (already in test phase), testing and introduction into the existing monitoring system incl. training of the monitoring team (training of staff)
- Introduction of regular evaluations (e.g. every two years), which also take gender aspects into account. Surveys are being regularly conducted in the course of the CO<sub>2</sub> monitoring process. Evaluations will be made yearly.
- Introduction of gender-differentiated indicators in the survey and monitoring of project activities (workshops, training of internal staff and external partners)

With the aim to raise awareness on gender issues at partner and customer level

- Implementation of a gender campaign at the level of retailers / end users.

# 1.11 Malawi

## 1.11.1 Summary and key data

Promoted technologies	 		
	<p><b>Improved Cookstoves (ICS):</b></p> <ul style="list-style-type: none"> <li>To meet the willingness-to-pay (WTP) of the rural population and to address the affordability-gap while following the LNOB principle, while at the same time developing the market by allowing profit margins, a demand side subsidy for verified stove sales will be paid to retailers</li> <li>Overall market development will be supported and local clean cooking entrepreneurs will receive tailored Business Development Support (BDS) to vertically integrate new business actors along the value chain</li> <li>Support ICS for SI and PUE, e.g. market development of the emerging innovative Chitofu 3in1 stove, developed with support by EnDev as a multi-purpose structure for efficient fish processing expected to reach 80% savings of firewood</li> <li>Supporting the National Cookstove Steering Committee (NCSC) as key member of the coordination group. Usage of NCSC as forum for strategic, policy, and regulatory advice, capacity building for conducive framework conditions and implementation of lessons from the field</li> </ul> <p><b>Pico PV and Solar Home System (SHS):</b></p> <ul style="list-style-type: none"> <li>Tailor-made Business Development Support (BDS) through expert pool for solar companies to improve capacities and business models</li> </ul> <p>Targeted marketing for picoPV as accessible option in LNOB approach, reducing space for low quality uncertified products on the market</p> <ul style="list-style-type: none"> <li>Sector support by building capacity and effectiveness of the Renewable Energy Industry Association of Malawi (REIAMA) to act as voice for the sector, push for consistent application of policy and increase understanding among duty-bearers</li> </ul>		
Summary of proposed interventions(s)			
	<b>Quantitative targets [# of]</b>		<b>Further relevant impacts/outcomes</b>
Energy for lighting / electrical appliances in households	27,737	People	30% PAYGO solutions for LNOB. E-waste addressed at national level.
Cooking / thermal energy for households	456,314	People	1 digital tool developed
Electricity and/or cooking / thermal energy for social infrastructure	8 (electricity) 19 (cooking)	SI	Technical training to women. Public-private cooperation improved.
Energy for productive use / income generation	100 (electricity) 294 (cooking)	MSMEs	Expanded product range. 50% of reached fish processors are women.
Project period	01.01.2021 – 31.12.2023	<b>Indicative Budget</b>	2,970,000 EUR <sup>48</sup>

<sup>48</sup> 2,365,000 EUR core budget + 605,000 EUR from ICEIDA

## 1.11.2 Theory of change (ToC) and state of market

### Improved Cookstoves (ICS) component

In 10/2020 the ambitious goal of disseminating 2million CLEANER<sup>49</sup> ICS (cumulative since 2013) was achieved, comprising 1.35 Mio Chitetezo Mbaula (CM) portable ceramic and fully-locally produced firewood ICS introduced by EnDev. Through its support to the National Cookstove Steering Committee (NCSC), a multi-stakeholder platform, EnDev is lobbying together with other stakeholders in the sector for new targets under the existing SEforAll action agenda and Malawi's newly developed Vision 2063. The goals are to be realized through a coherent monitoring system and a coordinated implementation plan in the sector. The coordinated efforts of the NCSC will help to position the issue of improved cooking high on the political agenda.

Approximately 98% of the growing population of over 18m Malawians use solid fuels (firewood or charcoal) for cooking. Firewood is the most common cooking fuel, used by 81% of the population. Accessibility and affordability of BLEENS (biogas, LPG, ethanol, electricity, natural gas and solar) as alternative cooking fuels remain low and limited to urban areas. The local ethanol production is mostly used for petrol blending. The national grid serves less than 10% of the population and the installed electricity generation capacity is insufficient for cooking. Urban supply chains of processed solid fuels to substitute illegal charcoal are emerging, but not yet in place. In rural areas, where the majority 84% of the population lives, firewood is nearly the exclusive cooking fuel (92.9% usage), yet only 17.6 % rural dwellers have access to alternatives to the 3-stone fire.

As Malawi still ranks among the poorest countries (174 out of 189 in the 2020 Human Development Index) EnDev continues to focus on the value chain of the CM, which is currently sold for 1.3 - 1.9 USD. Other ICS technologies are promoted and sold by other actors not merely on the urban and peri-urban areas for higher income classes. Therewith, the project continues categorically focusing on the 'leave no one behind' (LNOB) principle, to ensure the availability of an appropriate, efficient environmentally sound and affordable ICS technology for the majority of Malawian firewood users in rural and peri-urban areas. No other available technology has such a positive cost-benefit ratio to meet the low market potential for ICS technology in rural and peri-urban areas, which is characterized by a in general very low willingness to pay (or ability to pay). The CM is still the least-costly, locally produced ICS offering the best scalable pro-poor entry-level technology to get people to transition from 3-stone fires to an ICS. Based on tests conducted in 2019 by the ISO certified laboratory in Uganda, CREEC, the CM falls in Tier 2 of the ISO Voluntary Performance Tiers for thermal efficiency and CO, and in Tier 1 for particulate matter. The safety ranking is Tier 2.

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<sup>49</sup> In Malawi CLEANER stands for Convenient, Less smoke, Efficient on fuel use, Affordable and Available, Not harmful (safety), Easy to use, Robust

## Theory of Change - EnDev Malawi – ICS component

<p><b>Impacts</b></p>	<p><b>Energising Lives - Social development</b></p> <ul style="list-style-type: none"> <li>Improved economic resilience for households through available, affordable and sustainable ICS technologies</li> <li>Increased equality opportunities especially for school kids, girls and women</li> <li>Improved health and monetary savings for HH, Social institutions and fish processors</li> </ul> <p><b>Desired Situation:</b> Market for modern cooking solutions (ICS and fuels) is mature enough to be the vehicle to reach the national SEforALL targets (e.g. for the 84% rural population: 100% ICS for firewood users (up from 17.6% in 2016), 2% LPG stoves (up from 0.2% in 2016) and 4% electric cookers (up from 3% in 2016); nationwide target of 5million firewood ICS by 2030 (up from 0.5million in 2016))</p>	<p><b>Energising Opportunities - Economic development</b></p> <ul style="list-style-type: none"> <li>Secured jobs and income along existing value chains</li> <li>Increased SME productivity</li> <li>Deliberated resources at HH level for economic development</li> </ul>	<p><b>Energising Climate - Combating climate change</b></p> <ul style="list-style-type: none"> <li>Degradation of natural resources and forests is slowed down and GHG emissions are reduced.</li> </ul>
<p><b>Assumptions</b></p>	<p>This leads to sufficient access to and uptake of modern cooking solutions. Market approach, private sector engagement, further commercialisation, customer activation, and sales are sufficient to reach the indicated goals.</p>		
<p><b>Outcome</b></p>	<ul style="list-style-type: none"> <li>Despite the difficult economic situation of the rural population in Malawi, more households have taken up ICS.</li> <li>More entrepreneurs have entered the market along the value chain from SPG to end user sales, independent from ODA money.</li> </ul>		
<p><b>Assumptions</b></p>	<ul style="list-style-type: none"> <li>The demand side subsidies have increased the attractiveness for private sector actors to enter into the ICS market.</li> <li>Technical capacities are enough to use digital tools (e.g. ICS sales app)</li> <li>Private sector actors can be identified and motivated to enter the ICS market.</li> <li>SPGs have the potential and interest to further professionalise and organize value chains themselves.</li> <li>It is assumed that ICS will increase in the mid-term, is actively supported by the actors in the sector.</li> <li>Coordination and cooperation with health facilities works out and is supported by the government</li> <li>Viable new ICS technologies can be identified and are worth supporting</li> <li>Market for Chitofu 3in1 fish processing stove can be activated</li> <li>Last mile distribution can be economically viable</li> <li>Ministry of Energy is supportive to the sector in developing new sector goals on ICS (and fuels)</li> <li>Government of Malawi (GoM) and other partners (e.g. WHO) are interested to cooperate</li> </ul>		
<p><b>Outputs and results</b></p>	<p><b>Supply side:</b></p> <ol style="list-style-type: none"> <li>At least 5 cleaner cooking entrepreneurs are supported with Business Development Support (BDS) to build up independent ICS VCs</li> <li>3 middlemen in the ICS are integrated into the ICS sector by taking over steps along the value chain (e.g. collect ICS from SPG for aggregation, warehouse operation and/or on-ward sales)</li> <li>At least 8 artisanal SPG access refresher training for professionalized SPG business management (financial, quality standards, unified naming policy) and are ready to manage</li> </ol> <p><b>2. 1-2 new ICS technologies are supported in regard to marketing and agent activation</b></p> <p><b>3. 100 Chitofu 3in1 fish processing ICS built</b></p>	<p><b>Demand side:</b></p> <ol style="list-style-type: none"> <li>At least 30,000 demand side subsidies for ICS sales have been paid out in the 3 pilot districts</li> <li>Usage of ICS app (EnDev surveys) for data collection and verification has been tested</li> <li>30 last mile agents around SPG and at trading centres have been activated and are selling ICS</li> </ol> <p><b>2. A. Installation of ICS at guardian shelters of up to 10 health facilities in 4 districts - [COVID-19]</b></p> <p><b>B. Use of guardian shelters as sales points and/or storage facility for last mile distribution as well as for collection of ICS user experiences</b></p> <p><b>C. Usage of forest department facilities as sales and storage points for local private sector agents piloted at 15 sites</b></p> <p><b>3. Regular marketing activities connected to agent activation, supporting behavioural change, announcement of sales points, campaigning while delivery of ICS conducted</b></p>	<p><b>Enabling environment:</b></p> <ol style="list-style-type: none"> <li>NCSC meets regularly and has supported the GoM to formulate new ICS targets</li> <li>MBS is supported to confirm and publish the voluntary ISO standards adapted to the Malawian situation, including support to behaviour-change related recommendations for CLEANER cooking being developed.</li> </ol>
<p><b>Key interventions</b></p>	<p><b>Supply side</b></p> <ol style="list-style-type: none"> <li><b>A. Support local clean cooking entrepreneurs through Business Development Support (BDS) to vertically integrate all steps along the value chain</b></li> <li><b>B. Support commercial middlemen to serve along the ICS value chains (e.g. collect ICS from SPG for aggregation, warehouse operation and/or on-ward sales)</b></li> <li><b>C. Support selected artisanal SPG with financial literacy trainings, warehouse construction, adoption of voluntary standards for improved quality and unified ICS naming policy to put them into the position to become contract partners with stove entrepreneurs</b></li> </ol> <p><b>2. Extend EnDev's support (focus on marketing) to new and other technologies especially in urban areas in cooperation with MCHF program</b></p> <p><b>3. Support for market development of the emerging innovative Chitofu 3in1 fish processing ICS developed with support by EnDev as a multi-purpose structure for efficient fish processing expected to reach 80% savings of firewood</b></p>		
<p><b>Barriers</b></p>	<p><b>Supply side barriers</b></p> <ol style="list-style-type: none"> <li>Doing business in the ICS sector remains being difficult. A large number of people work in Stove Production Groups (SPG) in Malawi. But these SPG only produce ICS and do not engage in the following steps of the value chain. Therefore, they depend on NGO structures to buy the ICS. Professional ICS entrepreneurs are needed to provide services along the entire value chain (e.g. linking warehousing, distribution and/or retailing), further commercialize the market and to put it to scale. Only on larger scale operations viable profits can be realized.</li> <li>Although the currently supported ICS technology is the most suitable for LNOB and for the rural areas, no suitable next step solution is available in Malawi as private sector does not do sufficient R&amp;D and/or needs support with commercialization of prototypes.</li> <li>Even in commercial or institutional settings 3-stone-fires are still the baseline in most cases. Malawi lacks suitable solutions for ICS for Productive Use of Energy (PUE). For the ones emerging for PUE and still under development (like Chitofu 3in1 for fish processing since 2020), business models need to be developed and promoted.</li> </ol>	<p><b>Demand side barriers</b></p> <ol style="list-style-type: none"> <li>Given that profit rates in the ICS business in Malawi remain to be very low due to the limited willingness-to-pay and the affordability-gap, it is not attractive for private sector actors to enter the ICS market at all points along the value chain and in all areas.</li> <li>Due to low profit margins, the availability of ICS for customers along the last mile (including warehousing and sales points) is not sufficient. Sales points are few and very dispersed.</li> <li>Customers' knowledge of sales points is limited. Under economic scarcity, the willingness to invest in an ICS that is not absolutely needed is low. In this respect, user experience and behaviour-change are the best-selling points.</li> </ol>	<p><b>Enabling environment barriers</b></p> <ol style="list-style-type: none"> <li>A. Good framework conditions exist in regard to policies, but lack of engagement in policy implementation by the GoM and towards enhancing commercial ICS market conditions. After achieving the 2m ICS goals by 2020, the government needs new targets to keep the issue high on the agenda.</li> <li>ICS usage and promotion are multidimensional and multi-sectoral issues that are often not sufficiently mainstreamed.</li> <li>The ISO standards framework need the relevant parts to Malawi to be transferred into the national context to make them applicable for CLEANER cooking</li> </ol>
<p><b>Assumptions</b></p>	<p>The economic situation of the population in the rural areas remains tense as well as the price sensitivity high. Free collected firewood continues hindering uptake of ICS technology in rural areas. Further non-existing enforcement of the policies to ban illegal charcoal production and firewood collection.</p> <p>The NGO dominance in CM value chain organization will remain if NGO continue being the main project partners for commercialization and if no new incentives are created for independent actors entering the market and building up independent value chains.</p> <p>Availability of next step ICS solutions remains to be very limited.</p> <p>Financial barriers and lack for innovation will further prevail SMEs and SI to invest and adopt new ICS technologies.</p>		
<p><b>Root cause</b></p>	<p>The economic situation of the population in the rural areas remains tense as well as the price sensitivity high. Free collected firewood continues hindering uptake of ICS technology in rural areas. Further non-existing enforcement of the policies to ban illegal charcoal production and firewood collection.</p> <p>The NGO dominance in CM value chain organization will remain if NGO continue being the main project partners for commercialization and if no new incentives are created for independent actors entering the market and building up independent value chains.</p> <p>Availability of next step ICS solutions remains to be very limited.</p> <p>Financial barriers and lack for innovation will further prevail SMEs and SI to invest and adopt new ICS technologies.</p> <p>The economic situation of potential customers of ICS in Malawi is very tense (affordability-gap). In addition, the rural population in Malawi does not actually need an ICS, as firewood can still be collected for free in most cases (low willingness-to-pay). Although the uncontrolled collection of firewood and the informal production and sale of charcoal is illegal, the laws are not enforced by the executive (enabling environment). This leads to the fact that the willingness to pay for ICS is very low and a high price sensitivity prevails (demand side). Consequently, the price for the ICS technology supported in Malawi (namely Chitofu 3in1, a fully locally produced stove) remains unchanged at around 1.3-1.9 USD. This is a price that often only just covers costs but does not allow profits. In addition, ICS were often distributed by NGOs at even lower prices or even for free, in order to promote ICS distribution that otherwise would not have taken place. The current price level is commendable from a Leave No-one Behind (LNOB) perspective but is too low to generate viable commercial benefits and private sector engagement. At the moment, private sector players only enter the value chain at those points where NGO or carbon finance budgets are available to create profits. Thus, at present, there is no functioning market across all stages of the value chain, meaning the market remains NGO and carbon finance driven.</p>		
<p><b>Core problem</b></p>	<p>Market for modern cooking solutions (ICS and fuels) is not mature enough to be the vehicle to reach the national SEforALL targets (e.g. 100% ICS for firewood users in 2030 (up from 17.6% in 2016), 2% LPG stoves (up from 0.2% in 2016) and 4% electric cookers (up from 3% in 2016); nationwide target of 5m firewood ICS by 2030 (up from 0.5m in 2016)).</p> <p>This leads to a continued insufficient access to and uptake of modern cooking solutions (especially in the rural areas of Malawi and especially by the poorest society strata), which is resulting in forest degradation, soil erosion, increased risk for respiratory diseases and increased exposure of women and children to risk of sexual harassment while collecting firewood and staying at home by themselves.</p>		

### Pico PV and Solar Home System (SHS) component

The Government of Malawi (GoM) has set ambitious energy access targets in its Vision 2063 and the SEforAll action agenda. With grid extension currently reaching only 12.4% of the population and just 4% of the rural population, off-grid solar is seen as the major contributor to access for the near future. While the pico PV and SHS market are far from mature, there have been significant developments in the sector in terms of increasing development sector attention and some growth in many companies' capacities. However, the market shock of COVID-19 has led to a range of impacts, including reduced purchasing power on the demand side, resulting in lower revenues for solar companies, and strained product availability due to the increasing challenges around importation.

Increased support from development sector has been led by USAID with a SHS-focused program of 5m USD over three years between 2019 and 2021 and World Bank support of 20m USD for a similar program will take effect in 2021. FCDO support for the enabling environment, which has been relatively dormant, is also set to contribute positively to the sector as they take on a more active role. Through technical assistance to build up reliable solar companies, last-mile marketing support and sector coordination with the 14 companies in Malawi EnDev has been working with when the solar sector was still in its infancy, EnDev has to some extent paved the way for these interventions and FUTURE EnDev will complement sector developments as much as possible.

EnDev initially started supporting 2 companies in 2015 and managed to grow its network to 14 companies selling LG products with more companies showing interest to enter into partnership with EnDev. EnDev has been influential in leveraging and introducing LG products in the energy sector, attracting also other donors such as USAID who have set up a Southern Africa Energy Project Solar Home System Kick Starter Project, where EnDev supported in providing input for its set up and currently partners with them by supporting of its four awardees selected by USAID with fee-based tailormade marketing support and market intelligence data. EnDev closely works with USAID also to support sectoral activities including VAT and quality standards in conjunction with REIAMA among others. For companies that are not part of the USAID project. EnDev does further offer supports them through its IPs with marketing support, agent activation, telemarketing services to help companies generate sales and influence collaboration amongst players – which in turn facilitates product availability (by linking small companies with companies that have high import capacity such as Total Malawi which currently sales LG products on wholesale). EnDev's support to the sector has enabled participating partners to develop distribution networks, and also sale over 100,000 picoPV products (with annual sales increased by 600 percent compared to 5 years ago); and contributed to policy documents such as Malawi Renewable Energy Strategy, Malawi Sustainable Energy for All Action Agenda, and Energy Policy (which further paves way for distribution of high-quality pico-PV and SHS products in Malawi). The market remains challenging, with 3.5m households estimated to have low ability to pay. Although the current impact of COVID-19 on the household finances is not yet as significant in Malawi due to high degree of informal income and reliance on agricultural produce, this may become so in the foreseeable future.



The regulatory framework requires improvement as policy implementation is low/non-existent, and the sector lacks a strong unified voice. There remains the lack of any formal system for e-waste management.

Theory of Change - EnDev Malawi – Solar component			
	<p><b>Energising Lives - Social development</b></p> <ul style="list-style-type: none"> <li>Widespread household and time savings through access to certified solar lighting and charging products</li> <li>Significant reduction in accidents and inhalation risks from candles and polluting lamps</li> <li>Improved household education through solar lighting and radios supporting extended and resourced study</li> <li>Trained female technicians contribute to transforming perception of solar reliability and gender roles</li> <li>Businesses better understand women in Malawi and tailor their offering to their needs</li> <li>Women experience multiple benefits, including security and increasing ability for income generation, through access to solar</li> </ul> <p><b>Desired Situation:</b> Off-grid market matured, better placed and equipped to meet national targets for access to energy and deliver associated environmental and social benefits</p>	<p><b>Energising Opportunities - Economic development</b></p> <ul style="list-style-type: none"> <li>Businesses equipped to deliver on targets and longer-term growth through BDS / access to market intelligence</li> <li>Stronger environment for business and investment created through sector representation, advocacy and networking</li> <li>Barriers to investment at household and business level reduced and overcome (including through PAYG, PUE solutions, supply chain, insurance)</li> <li>Household investment in quality solar products facilitated over longer term through sustained and trusted points of contact (hotline, agents, repair centres)</li> <li>Benefits of off-grid solar available to economically marginalized through increased pico PV accessibility</li> <li>Small businesses to extend hours and increase revenue through improved lighting</li> <li>Increased market presence of PUE appliances driving positive consumer perceptions of RE efficacy</li> </ul>	<p><b>Energising Climate - Combating climate change</b></p> <ul style="list-style-type: none"> <li>Reduction of emissions from carbon-based lighting solutions through replacement with certified off grid solar products</li> <li>E-waste strategy with supporting interventions create sustainable solutions for management of e-waste and associated environmental emissions</li> <li>High trust in solar as sustainable solution for country's energy needs</li> </ul>
<b>Impacts</b>			
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Outcomes delivered can be sustained and collectively contribute to the development of a mature market, feeding into multiple social, economic and environmental benefits.</li> <li>The global pandemic COVID-19 will continue to have a substantial impact on the pico PV and SHS sector for the next 1.5 years and afterwards the sector will slowly improve due to the overall economic situation and the interventions taken by development partners and the GoM.</li> </ul>		
<b>Outcome</b>	<ul style="list-style-type: none"> <li>Reduction or mitigation of technical constraints and logistical challenges increases availability of quality, certified off-grid solar from business and willingness to buy from consumers.</li> <li>Greater visibility and improved communication on quality and service increases trust in off-grid solar.</li> <li>Businesses have greater capacity to develop independently and overcome challenges to serve market.</li> <li>Framework conditions support market development and positive environmental impact.</li> </ul>		
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>The demand side subsidies have increased the attractiveness for private sector actors to enter into the ICS market.</li> <li>Technical capacities are enough to use digital tools (e.g. ICS sales app)</li> <li>Private sector actors can be identified and motivated to enter the ICS market.</li> <li>SPGs have the potential and interest to further professionalise and organize value chains themselves.</li> <li>Coordination and cooperation with health facilities works out and is supported by the government</li> <li>Viable new ICS technologies can be identified and are worth supporting</li> <li>Market for Chitofu 3in1 fish processing stove can be activated</li> <li>Last mile distribution can be economically viable</li> <li>Ministry of Energy is supportive to the sector in developing new sector goals on ICS (and fuels)</li> <li>Government of Malawi (GoM) and other partners (e.g. WHO) are interested to cooperate</li> </ul>		
<b>Outputs and results</b>	<p><b>Supply side:</b></p> <ol style="list-style-type: none"> <li>8 companies increase sales by 50% through BDS (e.g. after successful coaching) or report alternative benefits against markers of business growth (e.g. received funding after improved investment-readiness)</li> <li>Trials conducted with logistics companies for distribution and collection of new/repaired and faulty products</li> <li>At least 100 women access technical training on solar, either within formal institutions, or tailored post-graduation training to develop specific skills and knowledge on solar kits and home systems through EnDev support</li> <li>Advancements in creation of E-Waste Strategy, with improved approaches to e-waste over project period, including piloting of return and repair centres</li> </ol>	<p><b>Demand side:</b></p> <ol style="list-style-type: none"> <li>Face-to-face campaigns (where applicable according to COVID-19 safety protocols), digital and radio marketing campaigns for solar companies selling lighting Africa certified products are conducted</li> <li>3-5 companies extend product range to introduce PUE appliances or PUE businesses increase sales through EnDev support to meet increased customer interest for PUE</li> <li>An average of 50 monthly calls at the solar hotline with satisfied customers (ratings at the end of the calls / through follow up survey with representative sample)</li> <li>At least 30% of products sold by partner companies influenced by EnDev support are quality pico PV sold as PAYGO products (to support the LNOB approach)</li> <li>Report on research findings, distributed to companies to enable better insight into consumer demand and behaviour, particularly relating to women</li> </ol>	<p><b>Enabling environment:</b></p> <ol style="list-style-type: none"> <li>Regulatory bodies such as MBS is capacitated to handle international standards and trials setting procedures in effort to start reducing the influx of grey products</li> <li>REIAMA reinvigorated as membership body, advocating for the energy sector, with majority of partner companies signed and paid-up as members</li> <li>SSHM held and ready to be institutionalised within REIAMA, improving market intelligence among businesses to support growth</li> <li>The topic of e-waste is addressed on the policy level (e.g. in political dialogue forums or even GoM policies)</li> </ol>
<b>Key interventions</b>	<p><b>Supply side</b></p> <ol style="list-style-type: none"> <li>Tailor-made Business Development Support (BDS) through expert pool for solar companies to improve capacities / models</li> <li>Supply-chain support to strengthen distribution (including pilots for distribution with commercial logistic companies) and retail channels</li> <li>Analysis and conceptualization of products insurance scheme to reduce risks to companies and increase professionalization</li> <li>Analysis of technical training / TVET and support for women to train as technicians</li> <li>Advocacy for repair and sustainable disposal of faulty / end-of-life products</li> </ol>	<p><b>Demand side:</b></p> <ol style="list-style-type: none"> <li>Face-to-face campaigns (where applicable according to COVID-19 safety protocols), digital and radio marketing campaigns for solar companies selling lighting Africa certified products are conducted</li> <li>Extend marketing and supply chain support to 3-5 PUE applications to meet customer demands</li> <li>Solar hotline provides increases accessibility for ordering and complaints for remote customers</li> <li>Targeted marketing for pico PV as accessible option in LNOB approach, reducing space for low quality uncertified products on market</li> <li>Consumer insight research, targeting women to inform companies' activities</li> </ol>	<p><b>Enabling environment:</b></p> <ol style="list-style-type: none"> <li>Support advocacy to MBS on standards, plus other bodies on regulatory framework</li> <li>Capacity support for REIAMA (private sector association) to act as voice for the sector, push for consistent application of policy and increase understanding among duty-bearers</li> <li>Continuation and transformation of Solar Stakeholder Meetings (SSHM) as platform for networking and information between solar companies ultimately under REIAMA</li> <li>EnDev will also lobbying through cooperation and partnerships towards GoM to address the topic of e-waste.</li> </ol>
<b>Barriers</b>	<p><b>Supply side barriers</b></p> <ol style="list-style-type: none"> <li>Companies lack capacity and have insufficiently developed / differentiated business models</li> <li>Distribution is insufficient to serve the last-mile and to make products readily and widely available</li> <li>Companies' efforts to increase accessibility (i.e. through expanding agent network) and affordability (i.e. through PAYG) of products for last mile and low-income consumers entails increased financial risks (i.e. default rates, increasing due to COVID-19)</li> <li>Technical capacity for installation / maintenance in sector still remains of low quality</li> <li>Long-term storage of faulty products reduces warehousing capacity</li> </ol>	<p><b>Demand side barriers</b></p> <ol style="list-style-type: none"> <li>Awareness of benefits of quality products still developing</li> <li>Knowledge about other applications of solar besides lighting and phone charging are limited, PUE appliances are not yet promoted, but interest for e.g. solar water pumps are expressed by rural community groups</li> <li>Lack of ongoing visibility / contact points creates trust issues, particularly on quality and warranty fulfillment</li> <li>Low purchasing power of consumers. 3.5 m households identified with low ability to pay with many (especially women) having limited income and lack of access to financial services. Ongoing potential for quality pico PV to fill affordability gap often disregarded with other donor (USAID and World Bank) support focused on SHS.</li> <li>Insufficient insight into drivers of consumer behaviour and demand (especially concerning women customers)</li> </ol>	<p><b>Enabling environment barriers</b></p> <ol style="list-style-type: none"> <li>Inconsistent application of policies / standards by the Malawi Bureau of Standards (MBS)</li> <li>Lack of understanding from duty bearers of challenges facing sector</li> <li>Lack of collective voice / advocacy for sector</li> <li>Insufficient networking platforms for companies</li> <li>Insufficient sharing of market intelligence among companies</li> <li>The topic of e-waste is not addresses on the policy level</li> </ol>
<b>Assumptions</b>	<p>Factors limiting the market take on multiple forms and require multiple approaches that allow companies to overcome them. Some of these are addressed through approach of other development partners, which will be complemented. But coordination among the development partners might be difficult in some cases). Companies use these interventions as a springboard to improve access to energy. Challenges and barriers introduced by crises such as COVID-19 will be adapted to overcome a limited time period rather than forming a core feature of the market.</p>		
<b>Root cause</b>	<p>Financial constraints of consumers, logistical challenges and lack of consumer awareness and trust limit the market (demand side). Businesses in the solar sector currently lack the financial and technical capacities to overcome these issues (supply side) and framework conditions provide insufficient support for market development and positive environmental impact (enabling environment).</p>		
<b>Core problem</b>	<p>The off-grid market for personal, home-scale devices and for off-grid solar solutions does not provide sufficient access to energy and is insufficient to reach Malawi's Vision 2063 and SEforALL energy access targets. While the sector is developing and drawing attention of donors, various market features present challenges in reaching access targets and delivering on associated environmental and social benefits.</p> <p>The SEforAll Action Agenda projected a reach of 3m pico PV systems by 2025 (p.141) and the Vision 2063 aims to increase access to electricity from 12.4% of total population in 2020 to 50% in 2030 and 100% by 2060. A large share of these milestones will need to be reached through off-grid home-scale solutions.</p>		

### 1.11.3 Transformative character

The COVID-19 pandemic has significantly affected operations of solar and ICS businesses in Malawi due to disruptions in value chains (e.g. importation of key production inputs have been disrupted as social distancing affected output in exporting countries, and increased trade and logistics costs and delays). The demand side effects include reduced employment, limited cashflow (remittances have also decreased due to lower global economic activity), social distancing measures and prioritization of essential goods as well as higher consumer risk aversion (households are likely to continue reducing unnecessary expenditure, while firms are expected to decrease investment until the crisis clears, negatively affecting aggregate demand and income).

#### Improved Cookstoves (ICS) component

EnDev's focus in the ICS component is to gradually improve the cooking stack and limit the use of baseline open fires by supporting the market development of a suitable LNOB oriented, entry level cooking technology at household level. Many successful steps in this direction have been taken in the previous years but considerable tasks in regard to market activation and further commercialization of all steps along the ICS value chain remain open. A new USAID and FCDO funded project addresses higher tier ICS solutions mainly for the approximately 15% urban population, but so far, no scalable ICS solution and fitting fuels have emerged due to lack of profitable market shares and sustainable customer relations. EnDev supports these activities with marketing support and coordinates with other projects in the NCSC but keeps up the focus on the CM as the LNOB solution for Malawi. EnDev brings in its proven expertise in the firewood space by leading the NCSC working group for firewood-based cooking especially for the rural areas. EnDev aims to sustainably replace open fires with better firewood cooking solutions of at least Tier 2 for fuel efficiency like the CM, which also allows the freedom to cook in the preferred space outdoors and reducing personal exposure to emissions that can be harmful to human health (in comparison to three-stone fire).

#### Market Development

Although nearly 1.4 million CM were disseminated since 2013 and the market has seen a yearly growth, the reduction of carbon finance programs as well as the COVID-19 pandemic has led to a decrease in sales figures in 2020. Earlier barriers in quantity and quality in production have been overcome, but major constraints in the commercialization of the CM value chain (i.e.. distribution and retail) remain due to the low profitability caused by a high price sensitivity and low willingness-to-pay, but also to a certain extent an affordability gap of the target group. EnDev's efforts to raise the sales price to increase the profit margins of value chain actors were hampered by these factors. In addition COVID-19 further affected consumer decisions and value chain logistics (e.g. because households continue reducing unnecessary expenditure and prioritize essential goods). The market remains to be very ODA and carbon finance dependent to bridge the profitability gap. To a major extent logistics and supply of retail structures are still organized mainly by development partners and NGOs. This inhibits wider engagement of professional as well as informal entrepreneurs in the ICS sector. It is therefore the aim of EnDev in the next 3-5 years to further liberalize CM supply chains as professional entrepreneurs are wanted on the topics of aggregation, warehousing and distribution of larger-scales to increase profitability by realizing economies of scale. But

also, informal last-mile retailers, who transport ICS for short distances and can create relevant profits given their context in rural areas are an important contribution to a successful CM market. Within 10 years' time, the CM market shall be fully liberal. Besides the private sector players, public structures should become more important to provide storage facilities for private actors, or become part of a reliable network of sales points to increase the availability of ICS across the rural areas and simplify messaging and access to the product at points of sale. EnDev will therefore work more with incentives for all independent market actors (not only for NGOs and development partners) and further support high potential entrepreneurs with BDS services and will activate last-mile retailers. To enhance the verification, EnDev will register sales in a customised survey app.

### **Economic Development**

EnDev continues to support in-country value creation through professionalization of actors and consolidated growth along the entire value chain. EnDev Malawi aims at maintaining and creating jobs especially in retail and distribution and contribute to the economic development in rural areas, where most of the CM production groups and last-mile retailers are located. So far, sales agent databases that are maintained by implementing partners indicate a bias towards women in rural retail. Efforts will be made by the project to rope in male actors with the aim of reaching a 60-40 gender distribution.

EnDev also supports the uptake of the emerging firewood-based Chitofu 3in1, an innovative multi-purpose ICS for efficiently frying, parboiling and smoking of fish, by fish processing SMEs along the lake shore of Lake Malawi (the Chitofu 3in1 based on the successful institutional Mayankho stove model). Awareness creation and a wider promotion of this new PUE technology is estimated to lead to economic gains for the users (considerable saving of inputs namely cooking oil, fish and firewood) and their customers, who will get increased access to affordable and high quality nutritious fish products. Additionally, the Chitofu 3in1 will contribute to reduce the post-harvest fish loss, which currently is 34% of the overall fish catch from the Malawi lakes! It is worth noting that while nearly all fishers are men, women make up around 60% of all fish processors in the country. Consequently, the project will aim at marketing this new technology to both men and women, making deliberate efforts to reach cooperative groups that have female composition (40% and above) and/or leadership and female owned SMEs.

### **Poverty alleviation**

EnDev will continue its focus on the least-cost pro-poor CM and the endeavour to LNOB and SDG1 by strengthening its rural availability and increase remote outlets.

The CM reduces fuel consumption by at least 30% and allows the users to cook with renewable biomass fuels from agricultural residues or household woodlots. Reducing household firewood consumption also reduces cost for purchase or the burden involved to collect it illegally, which is especially relevant for elderly and labour constrained female households.

EnDev will also explore more ways for the ultra-poor bottom of the pyramid to access the ICS, e.g. through demand side subsidies to increase profitability, which will attract the private sector to enter the ICS market, while keeping the price affordable even for the poorest of the poor. This is to a certain extent a scale-up of the successful Results Based Finance (RBF)-supported mechanism to reach the labour constrained Social Cash Transfer recipients which was implemented under EnDev's RBF facility.

### **Pico PV and Solar Home System (SHS) component**

As aiming for higher tier access has become the focus of other development partners, EnDev focuses on a synergetic market and social development aimed at poverty alleviation. It is recognised, however, that some interventions such as BDS and repair services may also facilitate higher tier access. Marketing services will be extended to benefit Productive Use of Energy (PUE) appliances and businesses as they go often hand in hand with pico PV and SHS promotional activities.

### **Market Development**

Last-mile focused marketing services, which have been instrumental in the development of the market thus far, will continue in a carefully targeted way to respond more closely to individual company needs as well as to new challenges resulting from COVID-19. This will be accompanied by tailor-made BDS, which will enable companies to develop and improve their potential to access finance and overcome barriers to increased household access to off-grid electricity. EnDev will also work on concepts to de-risk investment at company level through insurances schemes e.g. for default rates of PAYG mechanisms. With the assistance of such insurance schemes, the consequences of a global pandemic can of course not be covered (no insurance covers that), but the companies can be protected against other potential shocks such pandemic might cause (especially harvest losses).

The enabling environment will be improved by strengthening the sector's representative body (REIAMA), support for networking between companies and improving the application of quality standards (e.g. at the customs office).

### **Social development and environmental protection**

The focus will be on e-waste and increasing opportunities for women. On the latter, targeted market research will allow companies to respond to their specific needs. Support for women to train as solar technicians will improve the Malawian skills base for installation and repair, while creating opportunities for women and challenging perceptions on gender roles. While a national e-waste strategy is under discussion, current initiatives are unregulated. EnDev will continue to engage in discussions on the issue, while working towards reaching more coordinated approaches within the e-waste sector, including through support for repair services of solar companies. Economic development will be supported by job creation in the solar PU market, but also in sectors where PU solutions are applied (e.g. through improved efficiency and increased yield/income in the agricultural sector or transportation sector). This includes opportunities for SME and micro businesses, but also job and income opportunities for community businesses/cooperatives, of which many are managed by women.

### **Poverty alleviation**

The LNOB approach will focus on reaching the poorest sections of society, through increasing availability of quality, but low-cost picoPV to push the sub-standard products out of the market and by strengthening the supply chain through PAYGO solutions and local repair centres to better reach remote customers. The project will also support productive use activities focussed small scale businesses where picoPV solar lights will be integrated towards bicycle taxis usable for operators/owners within communities allowing them to have illuminated and extended business hours and also be able to save overtime – at the moment bicycle taxi use battery torches which are regularly replaced.

## 1.11.4 Collaboration

### Improved Cookstoves (ICS) component

#### Sector alignment

Since the last quarter of 2018, the final sprint towards, and finally the achievement of the ambitious target of 2million ICS by 2020 has strengthened the NCSC, the multi-stakeholder platform chaired by GoM through the Department of Energy (now fully operational as the Ministry of Energy, MoE).

MoE is assigned a GFP by the Department of Human Resources Management and Development who is responsible for mainstreaming gender in the work of the ministry. However, so far this approach has been characterized by the assignment of the role to a junior staff who has little or no influence on decision making and there has been a high turnover of focal persons, which defeats most capacity-building initiatives. In the EnDev-MW project team, there is a GFP who is supported by a GFP from the Country Office at Country Level. Team members work closely with the Project GFP concerning mainstreaming issues in their various components and hold quarterly compliance meetings on agreed gender targets

The arrival of the new government and the separation of the energy topic into a dedicated ministry has created an interesting momentum. The new Minister of Energy is very interested in the work of the ICS sector and participated in activities of the NCSC. The lobbying work of the NCSC for VAT removal on firewood stoves was finally successful in 2019.

EnDev, together with other stakeholders, has not only the mandate to coordinate the NCSC but is also the accepted technical lead of the firewood working group while other players lead the working groups (and the activities) for processed solid biomass including charcoal and the alternative fuels group including liquid and gaseous fuels. A strong NCSC is part of the exit strategy of EnDev to mainstream cooking energy among more stakeholders, to aim for and increased private sector involvement and to maintain the advocacy for the cleaner cooking topic.

#### Implementer base

The main NGO implementing partners, Maeve and United Purpose (UP), will continue to play an important role during the implementation. Nevertheless, EnDev will gradually shift its focus towards targeted support of selected entrepreneurs and informal last-mile retailers, to reduce the dominance of the NGOs in the ICS market for sustainability reasons. The role of NGOs along the ICS value chain is to be gradually transformed into a consultative one for private sector actors. In parallel demand side incentives and RBF like pay-out subsidy models will be available to any stove selling actor in Malawi (no matter if being an NGO, an independent agent, or associated to an NGO or not) in order to promote development of independent supply chains.

EnDev's LNOB and rural area focus is complemented by cooperation with the new project Modern Cooking for Healthy Forests (MCHF, 17 million USD jointly funded by FCDO and USAID). The focus is on urban fuels and higher tier ICS as well as firewood fuels for the protection of forest reserves.

Regular coordination is done with Modern Energy Cooking Solutions (MECS, FCDO - funded), and the University of Strathclyde as one of its leading implementers, concentrating on cooking with electricity and LPG in Malawi. EnDev as well as its implementing partners are in close coordination with MCHF and MECS and will cooperate throughout the

respective implementation. A strong ally since 2013 has been Irish Aid e.g. setting-up the Social Cash Transfer oriented RBF.

### **Leverage**

The CM developed by EnDev in 2005 is since the beginning officially the most sold and most-cost efficient cookstove in Malawi, with nearly 1.4million sold pieces since 2013, when the counting towards the 2 million ICS target started. Estimations say that the CM supply chain created over 5,000 income opportunities on the production level, of which 80% are taken up by women, mainly in the income contested rural areas. A few high-performing entrepreneurs have already been able to establish themselves in the market, but purely private sector driven initiatives are still underrepresented at the moment. This is expected to change as a result of the activities geared towards commercialization.

By organizing the nation-wide Cleaner Cooking Camp (CCC), held every year since 2012 (apart from 2020 due to COVID-19) EnDev facilitates knowledge exchange and supports to mainstream concepts generated by EnDev and its partners so that other stakeholders can use these and implement with their own resources (leverage of EnDev funding). EnDev uses its reputation and expertise to influence public policy and programmes. In addition, EnDev coordinates with and advises a wide range of private sector actors, NGOs and civil society organizations on various ICS issues (e.g. thermal energy for PUE, institutional ICS solutions as well as ICS business development issues). EnDev in many cases is the go-to-place for information about the ICS market in Malawi. EnDev has been successful in lobbying for mainstreaming of cooking energy into programming of other GIZ and KfW projects and donors. The GIZ Social Protection Project (SPP) will implement EnDev's RBF approach targeting social cash transfer beneficiaries into 1 or 2 more districts and Livelihood Fund has approach UP to do the same in 3 more districts of Malawi.

In 2019, the Embassy of Iceland signed an agreement with EnDev to co-finance the interventions on ICS and pico PV/SHS appliances for households, SI and PUE in the Mangochi district with 715,000 Euro until 06/2021 (extension 12/2021). This cooperation kick-started the development of the Chitofu 3in1 as in integrated ICS for its application by potentially over 1,000 fish processors along the 270 km of lakeshore in the Mangochi district and beyond. Prototyping is mostly completed. EnDev now supports the first scientific and commercial piloting and awareness creation to lay the ground for further commercial marketing of the Chitofu 3in1.

### **Nexuses**

Besides its LNOB approach, EnDev will technically support other implementers and projects through technical advice and knowledge transfer. EnDev will continue to support partnerships started in the past, e.g. the Ministry of Education to establish ICS in social infrastructure, which have been developed by EnDev as national standard for fixed institutional stoves. EnDev will also work with the Ministry of Health, the Malawi German Health Programme (MGHP) in Malawi, Maeve and the private sector to promote ICS for guardian shelters at hospitals. These interventions are linked to actioning Malawi's INDCs which include an unconditional policy-based target of energy saving stoves distributed to 400,000 households and a target to provide technical, financial and capacity-based support to increase the number of households using ICS to 2,000,000 by 2030. As 2 million cookstoves have been disseminated by 2020 (of which 1.4 million CM) the contribution to the NDC has been fulfilled, new targets need to be set.



EnDev seeks opportunities for circular economies to integrate waste-to-energy processes in agricultural value chains, e.g. with the GIZ project “More Income and Employment in the Rural Areas of Malawi (MIERA)” or the biomass project of the new agricultural company Pyxus. Special focus will be on advisory how to process large-scale agricultural residues like groundnut shells or rice husk into fuels for urban fuel supply chains (e.g. pellets, briquettes etc). This is in line with Malawi’s NDCs to promote the production and use of biofuels for cooking to replace fossil-based fuel as an unconditional target. EnDev will support the introduction and availability of appropriate ICS technologies to match the respective fuels. More recently EnDev started a close cooperation with the Aquaculture Value Chain for Higher Income and Food Security in Malawi (AVCP) to jointly support the further development and scale-up of the Chitofu 3in1. On the fish processing side EnDev also started to cooperate with the restructured Ministry of Natural Resources, that now houses the respective Departments of Fisheries, Forestry, and Environmental Affairs. With regard to firewood availability, EnDev seeks to link beneficiaries of agroforestry projects by Inter Aide to secure a customer base that is also paired with a sustainable fuel source and market for firewood for the wider communities.

### **Pico PV and Solar Home System (SHS) component**

#### **Sector alignment**

The significant role of pico PV and SHS appliances for energy access in Malawi is reflected in the country’s policy goals, and initial signs from a change in government in 2020 suggest a new commitment to working towards those goals. Though EnDev has long been the main player in supporting the pico PV and SHS sector, other development partners have seized opportunities that have partly been created through EnDev’s support, bringing significant new funds to the sector (mainly USAID and World Bank). Both have been focused on the SHS market, with RBF for a limited number of selected companies. Consequently, EnDev’s support will be tailored to meet needs of companies, which are not serviced by these larger projects, whether through working with companies which have not been selected under those projects, or by delivering support that works in tandem with other interventions (such as marketing support, hotline or repair services, or enabling environment support) or targeted support to increase picoPV availability to ensure opportunities for access to energy for the poorest and most marginalized in society.

To this end, EnDev has been engaging in close and regular consultation with the USAID SAEP, which has recently been extended to the FCDO’s Africa Clean Energy: Technical Assistance Fund (ACE-TAF - whose focus is on the improvement of the enabling environment) to ensure interventions are complementary and leverage each other’s work. This coordination will be potentially extended to incorporate the World Bank once their project lead is in place, alongside other players as the need arises. EnDev intends working towards taking lead in building a solar sector coordination group, possibly taking on a similar role as the NCSC in the ICS sector.

Development of an e-waste strategy for the Malawi Communications Regulatory Authority (MACRA) is being led by the International Telecommunications Union (ITU) in partnership with other expert bodies. EnDev is staying in close communication with this process to ensure it is responsive to issues in the sector.

UNDP focuses on mini-grids (as does a separate component of World Bank support) as well as social institutions. They will continue to be engaged for coordination on sector wide

issues such as improving the enabling environment, technical capacity and e-waste. At the same time EnDev is in close exchange with UNDP, under the Energy Donor Working Group, who are currently leading in setting up structures to coordinate Solar for Health initiatives (GCF proposal).

### **Implementer base**

Maeve, the local NGO, is envisaged to continue to implement marketing support on EnDev's behalf. Their reach to last mile customers to promote pico PV and SHS but also PUE applications will continue to be facilitated through partnerships with cooperative networks, such as Community Savings and Investment Promotion (COMSIP) groups, and Village Savings and Loan (VSL) networks.

With the growth in the number of companies engaged in the programme (currently at 14 but anticipated to rise further) more targeted support is needed to respond to companies' divergent challenges and opportunities. While Maeve's new approach will respond to this, a separate partnership will be developed with an expert firm to deliver BDS to companies in areas beyond marketing. Consultation meetings with the companies revealed that the majority of them are looking to grow their capacities in areas other than marketing, as they currently have structures in place for this. The pool of experts to be contracted experts are expected to by EnDev will be able to support the divergent business growth needs stipulated by the companies in ways Maeve is unable to. Under the co-financing agreement with the Embassy of Iceland, the NGO Sunfire Social will take care of marketing support in the Mangochi district – Sunfire will focus on setting up distribution networks and organise product deliveries and facilitating marketing activities in Mangochi district.

While they have been under-resourced and dormant for an extended period, the Renewable Industries Association of Malawi (REIAMA) is seen to hold the greatest potential as an advocate for and convener of the sector over the long term. Advocacy on regulatory framework issues around import (with Malawi Revenue Authority (MRA)) and standards (with Malawi Bureau of Standards (MBS)), alongside convening the sector through stakeholder meetings, is ultimately anticipated to be channelled through them with EnDev support.

### **Leverage**

EnDev's role as a first mover in the sector gaining increasing significance in the national debate and among development partners has led to an important role as a convener and for market intelligence. Through the benefits of its ongoing support, EnDev has developed a level of trust with its private sector partners and has fostered positive exchange between them at regular stakeholder meetings, which is the basis for future collaboration and reaching joint targets. This offers the the opportunity to leverage further sales through more stable markets and to further strengthen the policy framework.

While the 5million USD Southern Africa Energy project (SAEP) funded by USAID is now established and will close during the next project phase, the World Bank's 20million support will come into play in early 2021.

SAEP has created tools to strengthen market development targeted at their partner companies, and ACE-TAF will further take up this role and create more in future. EnDev will facilitate extending their reach through the EnDev network of company partners to generate further impact.

ACE-TAF is currently working on a 'health-check' for REIAMA. The additional support required by REIAMA to represent the sector will integrate with and build upon this.

EnDev will investigate the expansion of existing repair services to meet sector needs and to leverage sales through consumer trust while reducing e-waste (e.g. disposal or recycling of batteries). In addition, this is a good opportunity to strengthen the cooperation between the solar companies to address practical problems of the sector for sustainable consumer and environmentally friendly solutions.

### **Nexuses**

The BDS is anticipated to facilitate and capitalise upon linkages between different sectors. The development of an integrated response to e-waste requires coordination with the communications, environmental and local government sectors and players within them. COVID-19 has made it almost impossible for projects to deliver some of the field work via the usual channels. Community meetings with beneficiaries, trainings and other face-to-face meetings have been limited because of the risk to spread the virus. To ensure continued operations, EnDev has supported other GIZ programs in Malawi (e.g. Food and Nutrition Programm (FNSP), Basic Education Program (BEP), Aquaculture Value Chain for Higher Income and Food Security in Malawi (AVCP), Agriculture Technical and Vocational Education & Training for Women (ATVET4W) and More Income and Employment in Rural Areas of Malawi (MIERA)) to come up with alternative means of getting vital messaging (including mainstreamed COVID-19 prevention messages. This also gives the potential to gender targeted messaging) out to the target group, namely through the use of solar radios. The project will also closely work with companies that offer quality productive use applications for agriculture production and processing (technologies such as solar water pumps and/or solar drying technologies and/or solar cold chains). The project is also closely working with the Green Innovation Centres in integrating solar products within their food value chains (soya bean, cassava and ground nuts). The project envisions supporting agricultural VC entrepreneurs (e.g. Malawi Fruits) and potential partners under the green people's energy project (GBE).

### **1.11.5 Modalities**

#### **Improved Cookstoves (ICS) component**

In one of the poorest countries in the world, EnDev targets the cooking energy needs of poorer households with the CM. EnDev will continue a market-based approach to build a commercially sustainable market for this ICS, with the objective that in future value chains are directly linking suppliers with retailers without NGO dominating the wholesale structures. The challenges have increased in 2020/2021, such as slimmer profit margins by the COVID-19-aggravated lower willingness of consumers to pay more than 1.5 Euro per ICS, but also through an increased affordability gap. Nevertheless, EnDev is committed to the LNOB logic and will explore new ways to increase affordability of the ICS and profitability of the distribution chain. Currently, consumers are unable or not willing to pay a cost covering price for the ICS and are therefore not in a commercially serviceable position.

Under those circumstances, the traditional implementation through contracts with NGO implementing partners cannot secure results as in the past. As consequence, sales through Grant Agreement schemes will be faded out and a more flexible results-based approach is

required. Building on the logic and the learnings of the RBF approach in Malawi<sup>50</sup>, a demand side subsidy (DSS) will therefore be piloted in up to 3 districts (selection criteria to be established) in cooperation with one of the implementing partner or a micro-finance institute (e.g. FincaFINCOOP). The DSS will be piloted in form of a conditional (meaning only one specific product, the CM, will be supported) and untargeted (meaning the whole population in a geography) end-user subsidies (about 0.65 to 1 USD), which will keep the costs for the consumer on a low level and will buffer profit margins of the sales agent. This has the potential to address the affordability challenge and enable energy access for the most vulnerable communities as it keeps the price at a low level. While keeping the price low, the subsidy, which will be paid out to the retailer after verification, will allow profits where they have been impossible before for the mentioned reasons. Therewith, the DSS will foster new market opportunities e.g. through an increased commercial sales agent network or the entry of ICS logistic entrepreneurs. This does not make the market immediately independent from NGO support or carbon finance, but integrates the private sector, allows continued affordability and increases outreach also in geographic areas, where current implementing partners are not active. As the incentives/DSS scheme will be open to all market actors, NGOs can still further act within the market and making use of their comparative advantage of existing retail structures, but they become competitors in the market. This new DSS scheme should encourage more entrepreneurs to act as middlemen in the distribution chain and take over the transport of the ICS from production to the users that was previously dominated by non-commercial NGO or can target areas, where NGOs have not had capacities to roll out their support. NGOs and private sector can also build new alliances to flexibly adjust supply chains and retail networks and share profits from the DSS incentives.

The private sector has in the mid-term the potential to build up supply chains more cost-efficient and more flexible than NGOs could do (no overheads, flexible business strategies, etc.). Entrepreneurs can realize economies of scale or use stove sales as a side business and be in the starting blocks as the ICS price is slowly increased, which should happen eventually in the mid-turn and is supported by the players in the sector. Further market distortion is not a risk as the ICS market in Malawi would barely exist without the donors/NGO stimuli.

The verification and monitoring of stove sales to qualify under the DSS scheme will be done cost efficiently by EnDev or partners (learning from the RBF). In future sales shall be recorded and verified via a new App. The DSS scheme also allows in future to register sales of any type of ICS technology and qualify for future support mechanisms.

The grant agreements with Maeve and UP will then only concentrate on supporting the supply side of the ICS value chain where public funding is well applied (e.g. quality assurance and BDS) or on general market support (marketing campaigns, coordination role). On the supply side they will A. support middlemen to serve along the ICS value chains (e.g. collect ICS from Stove Producer Groups (SPG) for aggregation, warehouse operation and/or onward sales), B. support selected artisanal SPG with financial literacy trainings, warehouse construction, adoption of voluntary standards for improved quality and unified ICS naming policy (e.g. serial numbers) to put them into the position to become contract partners with stove entrepreneurs, C. support “the next generation” of local clean cooking entrepreneurs

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<sup>50</sup> In Malawi the RBF was implemented in form of a cooperation with the Government's Social Cash Transfer (SCT) scheme to reach the 10% ultra-poor, labour constrained households excluded from the commercial market, by providing them an ICS, which they would not be in the position to buy themselves.

through Business Development Support (BDS) to vertically integrate the all steps along the value chain, and D. support general CM and ICS market with umbrella marketing campaigns and identifying agent networks to qualify under the DSS scheme. Through corporations with MCHF EnDev and the implementing NGO will extend the marketing support to new higher-tier technologies for the urban areas.

Besides the DSS, activities on the demand-supply side linkage revolve mainly around building sales structures in the rural areas along the last mile and carrying out marketing activities connected to agent activation, supporting behavioural change, announcement of sales points.

An approach to densify the network of reliable ICS sales structures closer to the users is the cooperation with health posts and forestry facilities. As a pilot fixed CM cooking facilities will be installed at up to 10 health facilities to raise awareness with the guardians of hospitalized persons for ICS and to reduce the costs of patients for fuel wood while they are staying at the health facility. This will tie in with a planned joint campaign with the Ministry of Health on respiratory health in connection with cleaner cooking and COVID-19. The Department of Forestry offered to use their infrastructure in and around forest reserves to serve as sales points for ICS.

Additional efforts to enhance last-mile distribution are linked to partnerships with existing projects on the ground. The target beneficiary areas of programmes such as GIZ's Social Protection Programme (SPP) and the KfW funded project to build hostels for student teachers and houses for primary school teachers in 60 schools across the country are an injection point for more stoves to reach end-users<sup>51</sup>.

Regarding the Chitofu 3in1 EnDev supports the construction of demonstrations units in selected strategic places and follows a fully commercial approach from the start by supporting entrepreneurial contractors to build good quality Chitofu 3in1 for the fish processors and explore options to improve access to the technologies through tailor-made financial modalities. These market enhancements will be accompanied by activities addressing the enabling environment at policy level. After reaching the 2million ICS goal, EnDev is with the NCSC to set new national targets. Therefore EnDev, in coordination with the other members of the NSCS, will lobby with the GoM towards a new mandate, the alignment of the ICS topic within the government structures, and the cooking sector coordination with private sector and development agencies.

### **Pico PV and Solar Home System (SHS) component**

The pico PV/SHS market has reached a point of development where the barriers to growth are multi-level and multi-faceted. Considering this, and complementarity to interventions undertaken by other development partners, an approach has been devised that builds on past successes but responds to current needs through different implementation pathways.

Whilst umbrella marketing campaigns have been key in the development of the sector, and which has been the dominant feature of EnDev's support, recent analysis has shown reduced interest from companies as their needs have shifted. Extended consultations with

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<sup>51</sup> Currently, EnDev has facilitated the link to a private sector actor to distribute over 8,600 free stoves to the government's social cash transfer beneficiaries in a pilot project in conjunction with SPP. A further 5,000 stoves for commercial sales will be supported by EnDev with the private sector actor receiving a DSS from EnDev for the sale of those stoves, once the DSS scheme is set up. EnDev has also facilitated the provision of over 500 fixed and portable stoves by a private sector actor to be supplied to primary school teachers in the KfW construction project being implemented by GOPA Infra in the first semester of 2021.

implementers, companies and other players have illustrated that, as the market has grown, several factors have influenced this shift of interest. At a practical level, it is difficult to effectively represent the products of 14 companies, representing about 85% of supplier for quality solar products in Malawi, through a single modality. Furthermore, with some companies now maturing, they are developing their own successful approaches and systems, including in relation to marketing. The approach now, therefore A. focuses on tailored, demand-orientated support, to allow companies to overcome market barriers and trial new approaches to expand, and B. to strengthen sector organizations like REIAMA.

Marketing remains an important element within EnDev's approach, and a cost-effective means of market development, as there are still gaps in awareness and demand. The long-term implementation partner Maeve has the first-hand marketing, last-mile distribution and agent-activation experiences in-house. However, marketing advice will be individually targeted to the needs of companies, particularly allowing the development of companies unsupported through other programmes and for supported companies to trial novel approaches to reach new markets (especially in line with a LNOB and new, albeit small-scale, PUE approaches). In addition to this, a continuation of the interventions collectively seen as most valuable by the companies is planned, specifically radio marketing, and a central "solar-hot-line" to reduce communication barriers between companies and consumers. Notably, both of these interventions are key in maintaining market presence during the COVID-19 pandemic. Finally, also related to LNOB, (as well as the recognition of donor support being focussed on SHS products) Maeve's marketing support will be focused on boosting the availability of pico PV products as an accessible product for economically marginalized consumers. Emphasis will be focused on displacing substandard uncertified products from the market, to increase the possibility of sustainable energy access for underserved markets. As complementary activity, EnDev will lobby on policy level and with government and sector agencies (MBS, REIAMA, ...) to improve enabling environment for products complying only to accepted international standards.

Innovative ways of bringing the product to the customer will be implemented: Rather than building on a fixed distribution chain and deliveries along planned routes or collected orders from agents, it is envisioned to flexibly use courier services to distribute solar products along the VC through the country and just in time, which will help overcome some challenges presented by COVID-19, while the relationship with a private sector courier service will offer cost efficiency and sustainability.

On a conceptual basis, EnDev will work to identify insurance products (e.g. focusing on default rates of PAYG approaches), which could be made available towards the companies in future as a means of response to the market impacts of COVID-19. The aim would be to de-risk companies' expansion to serve challenging markets (remote and financially excluded) and protect them from further market shocks. Potential partners under this activity are PULA, local insurance providers and others.

Reflecting a needs-based approach, EnDev will contract an expert pool to deliver BDS to companies, helping them to overcome key and unique barriers to their development and sustainability. These services are provided on the basis of a needs analysis and are open to the same extent to all companies selling Lighting Africa/VeraSol certified products. Such demands reflect the growing maturity and differing needs of the market players, and the difficulty in meeting them through a 'one-size-fits-all' intervention. Working towards the longer-term growth of the companies on an individualised level also contributes to the exit strategy of EnDev market support.

EnDev will continue its role as a convener for the sector through stakeholder coordination meetings, while developing the capacities of REIAMA, an already existing but currently not well performing private sector association, to ultimately take on this role and increase companies' access to market intelligence. Additionally, REIAMA's representative role will be strengthened to enable them to lobby for improved framework conditions, particularly on issues of importation and standards, which have been causing direct disruption to market development, for example, through inconsistent application of tax codes for importation. Building the capacity of REIAMA supports longer term sustainability and leverages complementary support from other sector players.

E-waste is a significant environmental issue that requires attention in Malawi. While engaging in policy discussion led by other actors, EnDev will support investigation and research of sustainable management solutions and improved availability of repair services, both reducing the e-waste burden in increasing consumer trust in warranty services. The research which is to be carried out by a consultant will be conducted in unison with other key players in the sector, towards the conceptualization of an overarching e-waste strategy for Malawi. EnDev will also lobby through cooperation and partnerships towards GoM to address the topic of e-waste.

Specific direct interventions are planned to promote gender equality in relation to the sector. These focus on developing companies' understanding of, and ability to meet the needs of women consumers and building the capacity of women as solar technicians.



## 1.11.6 Results

### Improved Cookstoves (ICS) component

#### Quantitative results ICS component

The quantitative targets in the table below will be realised as of 12/2023 through the interventions/funding A. Basic proposal (BP), and B. ICEIDA co-financing agreement (06/2021, no-cost extension to 12/2021).

Project results	Targets 2012-2023	Additional Targets 2021-2023	Other target dimensions/indicators
People: Access to Cooking	1,695,439 <sup>52</sup> people (BP and ICEIDA):	456,314 people	1 digital tool for sales registration and verification developed
SI: Access to Cooking	19 SI (BP: 13 SI; ICEIDA: 7 SI)	19 SI (BP: 13 SI; ICEIDA: 7 SI)	Public-private collaboration improved. Cooperation with at least two ODA projects.
PU: Access to Cooking	325 SME (BP: 318 SME; ICEIDA: 6 SME)	294 SME (BP: 288 SME; ICEIDA: 6 SME)	500 women (100%) in street food business reached 50% women in SME fish processing reached.

#### Outputs ICS component

Supply side:

- At least 5 cleaner cooking entrepreneurs are supported with BDS to build up independent commercial ICS value chains.
- 2-3 middlemen in the ICS are integrated into the ICS sector by taking over steps along the value chain (e.g. collect ICS from SPG for aggregation, warehouse operation and/or on-ward sales)
- At least 8 artisanal SPGs access refresher training for professionalized SPG business management (financial, quality standards, unified naming policy) and are ready to manage
- New stove technologies fulfilling EnDev's criteria are supported (start to be integrated into market awareness campaigns) – targets to be defined

Demand side:

- At least 30.000 demand side subsidies for ICS sales have been paid out in the 3 pilot districts
- Usage of ICS app (starting with EnDev surveys) for data collection and verification has been introduced and tested
- Installation of ICS cooking facilities at guardian shelters of up to 10 health facilities (potential for further upscaling with partners)
- Usage of guardian shelter ICS as sales points and/or storage facilities for last mile distribution as well as for collection of usage experiences

<sup>52</sup> The number reached is a combination of the baseline proposal and ICEIDA targets. At least 60,000 ICS will be distributed under the ICEIDA component, which will be implemented by 12/2021, and the additional 372,000 ICS from the baseline proposal will be distributed by 12/2023. Based on ICS lifespan, which is currently under review, the current ICEIDA contribution numbers are negligible, but may be adjusted if lifespan values are adjusted. If lifespan is adjusted upward, the outcome number will be higher.

- Usage of forest department facilities as sales and storage points for local private sector agents is piloted at 15 sites
- 30 last mile agents around SPG and at trading centres have been activated and are selling ICS
- Regular marketing activities connected to agent activation, supporting behavioural change, announcement of sales points, campaigning while delivery of ICS conducted
- At-least 618,500 ICS are disseminated by private sector players and IPs (Out of the total sale, 558,500 ICS are disseminated across the country until 12/2023; additional 60,000 ICS are disseminated exclusively until 12/2021 in Mangochi District)
- At-least 10 guardian shelters at health centres have fixed ICS installed until 10/2021 (with 7 installed in Mangochi district and 3 in other health centers within Malawi)
- At-least 60 Teacher Training Colleges (TTC) are equipped with fixed CM units (420 CM) with funding from GOPA/kfW and installed by EnDev trained contractors
- At-least 20 rockets stoves are distributed to 3 primary schools in Mangochi District
- At-least 500 CM sold to street food businesses (with 500 of the SMEs led by women, and 100% comprised of women)
- 100 Chitofu 3in1 stove built for fish processing enterprises (with SMEs comprising of 50% men and women)

Enabling environment:

- NCSC meets regularly and has supported the GoM to formulate new ICS targets
- MBS is supported to confirm and publish the voluntary ISO standards adapted to the Malawian situation, including support to behaviour-change related recommendations for CLEANER cooking being developed,

## Pico PV and Solar Home System (SHS) component

### Quantitative results Pico PV and Solar Home System (SHS) component

The quantitative targets in the table below will be realised as of 12/2023 through the interventions/funding A. Basic proposal (BP), and B. ICEIDA co-financing agreement.

Project results	Targets 2012-2023	Additional targets 2021-2023	Other target dimensions/indicators
People: Access to Electricity	BP and ICEIDA: 69,034 people	27,034 people	30% picoPV sales are PAYGO solutions for LNOB
SI: Access to Electricity	8 <sup>53</sup> SI	8 SI	100 women accessing training on solar. Cooperation with at least 2 ODA projects. Sector coordination improved
PU: Access to Electricity	100 SME	100 SME	Product range for PUE expanded. 50% sales increase of 8 solar companies.

### Outputs Pico PV and Solar Home System (SHS) component

Supply side:

<sup>53</sup> Calculated 427 SI targets reachable within 2021. Adjusted downwards to eight due for the lifespan of the technology for the picoPV products.

- 8 companies increase sales by 50% through BDS (e.g. after successful coaching) or report alternative benefits against markers of business growth (e.g. received funding after improved investment-readiness) and/ or support in piloting new business strategies with companies that result into sales
- 2 trials conducted with logistics companies for distribution and collection of new/ repaired and faulty products
- At least 100 women access technical training on solar, either within formal institutions, or tailored post-graduation training to develop specific skills and knowledge on solar kits and home systems through EnDev support
- Advancements in creation of E-Waste Strategy, with improved approaches to e-waste over project period, including piloting of return and repair centres

#### Demand side:

- 30 face-to-face campaigns (where applicable according to COVID-19 safety protocols), digital or radio marketing campaigns for solar companies selling lighting Africa certified products are conducted jointly by EnDev, IPs and the solar companies
- 3-5 companies extend product range to introduce PUE appliances or PUE businesses increase sales through EnDev support to meet increased customer interest for PUE
- An average of 50 monthly calls at the solar hotline with satisfied customers (ratings at the end of the calls / through follow up survey with representative sample)
- At-least 30% of the product sold by partner companies influenced by EnDev support are quality PAYGO picoPV systems (to support the LNOB approach)
- Market intelligence data (report, research findings) distributed to companies to enable better insight into consumer demand and behaviour, particularly relating to women
- At least 100,000 solar picoPV systems distributed until 12/2023 by participating partners (in these sales 20,000 solar picoPV are sold in Mangochi until 12/2021, and in parallel 80,000 solar picoPV systems across the country until 12/2023)
- At-least 1400 solar radios are distributed to communities as a covid response measure with support by other GIZ projects
- In Mangochi district social institutions access solar for lighting: at-least 4 primary schools have solar systems installed; at-least 12 staff houses at primary schools have SHS systems installed; At-least 4 health facilities have solar systems installed and at-least 3 houses for health workers have an SHS system installed.
- At-least 300 solar lamps are sold to bicycle taxi operator by partner companies following an incentive mechanism (to encourage PUE activities)
- At-least 20 solar water pumps sold by participating solar partners to farmers and/or farmer groups

#### Enabling environment:

- Regulatory bodies such as MBS is capacitated and adopts international standards piloting evidenced product screening exercises (in pursuit to reduce influx of grey products)
- REIAMA reinvigorated as membership body, advocating for the energy sector, with majority of partner companies signed and paid-up as members

- 5 SSHM held and ready to be institutionalised within REIAMA, improving market intelligence among businesses to support growth
- The topic of e-waste is addressed on the policy level (e.g. in political dialogue forums or even GoM policies)

## 1.11.7 Sustainability

### Improved Cookstoves (ICS) component

#### Financial sustainability

The aim is to make in the long-run the entire stove value chain profitable and independent from ODA by creating economically sound structures and processes. On the supply side, the stove production has become a financially viable business especially on the professional level. The stove distribution and retail is currently the weak link in the value chain as the transport is not yet profitable and still relies on ODA support and retail structures are dependent on the same. The DSS will increase profitability at the subsequent levels of the supply chain and thus promote the entry of the private sector into the ICS market. This does not make the market immediately independent, but allows continues affordability (LNOB). The private sector has the chance to get to know the business and turn it in the mid- to long-term into profitable SME on the distribution and micro retail businesses in the rural areas, either together with current NGO linkages or independent from NGOs. This development accelerates essentially under the assumption of rising prices, which is promoted in balanced degree by the Sector. Market distortion is not a danger as the ICS market in Malawi would barely exist without the donors/NGO stimuli. This is rather a measure to reduce this dependency.

On the demand side the payback-period is currently less than 2 months in urban areas where firewood is purchased, making the investment in an ICS economically interesting. In the rural areas where firewood is still collected illegally for free this equation does not hold for the decision makers in the households (mostly men). Women and often the children of a household are collecting the firewood and their working time is unfortunately not quantified in monetary terms. In the mid- to long-term the financial sustainability is likely to increase with increasing fuel prices and scarcity of firewood and therefore increased potential to save money. With a bottom-up approach to build the market for the locally produced affordable CM, income generated all along the supply chain (currently mainly generated at production level) stays in the country and contributes to (rural) economic development. While stove users continue to save money on firewood in the urban areas, in the rural areas women and children can save time which can be invested in other economic activities. The producers of the CM realise the most significant economic gain, allowing investments in education, home improvements etc.

#### Institutional sustainability

The fact that Malawi has reached the target of 2 million ICS in 2020, with the majority of these being CM, shows that this entry level ICS, yet Tier 2 in regard to fuel consumption and carbon monoxide exposure, has the potential to reach even more end users in the population. Especially the 80% living in the rural areas, where the most vulnerable and hardest to reach communities live, who are completely dependent on fuelwood. Through the NCSC, EnDev has managed to advocate for a VAT exemption on wood cookstoves to mitigate

barriers for adaptation. EnDev will support the Department of Energy and NCSC in setting a new target for ICS goals and linking it to a goal for stove-related fuels. In this context, EnDev will also encourage implementing partners to work with stakeholders in agriculture, forestry, food, health, and aquaculture to create strategic synergies between each entity's program goals. This will include marketing ICS to farmer groups using behavior change messages that highlight the benefits of linking their current activities in these sectors to incorporating the daily use of ICS.

### **Ecological sustainability**

Tests for fuel consumption during the firing of the CM indicate 1.6 – 3 kg of firewood used for one stove, depending on kiln size. This is less than half what a household uses per day on a three-stone fire, so potential savings by using the ICS outweigh the firewood input for the production after 1-2 days of its use. In addition to continued monitoring of clay pit refilling at mining sites, EnDev will encourage SPG to link stove production activities with the establishment of woodlots and the synergies with communities engaging in agroforestry to source firewood for stove kilns.

### **Technological sustainability**

Refresher trainings for both professional and artisan SPGs are essential to ensure the continued quality of the CM produced. EnDev's implementing partners continue training on the usage of quality control tools for and adherence to the guidelines in all steps of production to provide durable and well-performing ICS. Recently, EnDev has conducted a study on the lifespan of CM which confirms the observation that the ICS are in use on average twice as long as currently calculated, namely 4 years instead of 2 years (final report outstanding and implication on the OCS not clarified yet).

### **Social sustainability**

Working with clay was traditionally an undervalued female domain, but stove production has become a respected and successful business with social prestige and increasing gender-equal participation. Over the years, EnDev has had success in raising the awareness of the CM nationwide. Social behaviour change messages will be the primary driver for increased adoption of the ICS. EnDev will develop key messages for social acceptance of the ICS related to user experience, economic benefits, health benefits, social benefits, and overall consumer benefits to present the ICS as an attractive investment for both men and women.

### **Exit & handover strategy**

The target is to create enough demand and strong actors with a long-term perspective along the entire value chain to ensure smooth flow and healthy growth of the market without ODA support. EnDev addresses the biggest barriers and weakest links in the value chain, the lacking profitability of the distribution chain to ensure that production, distribution and retail will be sustained on the long-term. The plan is to rake in private sector actors who can take over the distribution chain and retail that is currently ODA-dependent. With strong EnDev support stove production has grown exponentially over the last 7 years. Now it is time to slow down growth rates and consolidate production. For investments in production assets, warehouse capacity and the integration of additional steps of the value chain. The most promising producers will be linked to BDS, SPG will be supported and new entrepreneurs will be motivated to enter into the market. A DSS scheme will open a competitive market

where current dominant NGOs will have to collaborate or compete with new private sector actors in the old or in new geographical areas. The DSS has to fade out over the years. A strong NCSC is part of the EnDev exit strategy to continue EnDev's role in the cooking sector development so far, anchor advocacy and spread the mainstreaming of cooking energy among more stakeholders including private sector, government, donors and NGO. EnDev currently has the role of Coordinator of the NCSC which it is using to support the Ministry of Energy to take on the leadership role as the chair of the stakeholder platform. EnDev is also assisting in the development of the NCSC's new stoves and fuel goals for the Ministry to spearhead in cleaner cooking, supporting the government's nomination and preparation as a Global Champion for the High Level Dialogue on Energy Access resulting from the success of the achievement of the 2 million stoves by 2020 goal, the development of domesticated voluntary standards in Malawi for cleaner cooking, as well as providing linkages within the stakeholder platform for continued collaboration amongst sector players. At present, EnDev is doing the latter by being the Technical Lead on the working group for Firewood and Firewood Cookstoves.

## Pico PV and Solar Home System (SHS) component

### Financial sustainability

The interventions foreseen under this project have been targeted towards sustainability and facilitating EnDev's eventual exit from the market. The tailored support provided, especially the BDS, will enable companies to strengthen, increase business sustainability and improve their potential to access finance. This will complement the World Bank's work to increase availability of financing and companies' readiness for it (focused on the SHS market). The tailored nature of the marketing interventions, and their emphasis on trialling new areas of business, point to these eventually being incorporated within the companies themselves. Additional services, such as supply chain support, are envisaged through private providers, allowing for direct contracting of the services by businesses after project completion. By channelling activities through a local partner NGO, Maeve, over this and prior project phases, EnDev has embedded activities locally, ensuring the potential for their continuation after project conclusion.

The development of future insurance schemes could de-risk investment of solar company e.g. default rates of PAYG mechanisms. The consequences of a global pandemic can of course not be covered (no insurance covers that), but the companies can be protected against other potential shocks that are caused or increased by a pandemic (especially harvest losses of farmer clients). Under normal circumstances companies and their clients might be able to cope with such shocks but weakened by the current COVID-19 situation they are quite vulnerable and might be through the insurance scheme put into a position where they would survive additional external shocks. The experience of utilization is intended to contribute to the professionalization of the companies, as they might use such products independently in the future after positive experiences.

REIAMA is a membership organisation and coordinated donor support will allow it to move to a position where its services repay the collective investment of its members to sustain it. Financing for e-waste management is being planned as part of the development of the national E-Waste Strategy (currently envisioned under the producer pays principle).

### **Institutional sustainability**

The further development of REIAMA will facilitate their adoption of EnDev's current role as convener for the sub-sector, and institute the role of sector representation within them, with further potential for them to host knowledge resources and share market intelligence. This will be a key facet for the development of the enabling environment, with their representational role facilitating improved understanding among duty bearers and ongoing advocacy for overdue improvements to regulatory framework conditions. REIAMA acts as the platform for engagement between GoM agencies such as the Malawi Revenue Authority, the Malawi Bureau of Standards and the Malawi Energy Regulatory Authority, bringing discussions to the table from both sides to discuss key issues that affect the sector, e.g.: the need for Malawi to adopt clear standards on solar products, certification of products and services as well as classification of products that are to be exempt from VAT as per the government's 2019 declaration to remove VAT on renewable energies in order to increase adoption.

Cooperation with the professional network REIAMA and other projects strengthens EnDev's network of currently 14 solar companies and will secure coordination and cooperation beyond the project duration.

### **Ecological sustainability**

PicoPV and SHS replace lighting through dry cell batteries and candles, which are more harmful to the environment and health. The promotion of quality systems with warranties reduces e-waste. A range of specific interventions are foreseen to resolve the absence of e-waste management processes in Malawi. Central to this will be the development of a National E-Waste Strategy, a process being led by other organisations with EnDev as a close contributor. At a sectoral level, EnDev will work with companies on improving the availability of repair services and identifying e-waste management solutions, to reduce environmental impacts and place pico PV and SHS companies as first movers in resolving the challenges posed by e-waste.

### **Technological sustainability**

The solar component only supports Lighting Africa or VeraSol certified products. Especially with the pivo PV focused LNOB approach sub-standard products, which are sold across Malawi at regional trading centres, should be pushed out of the market and by a strengthened availability and supporting marketing activities, which focus on quality differences, after-sale services and warranties. In part, issues of replacement and repair are dealt with in relation to e-waste above, though there may be associated work on the regulatory framework considering parts for repair of solar products are subject to different framework conditions than the products themselves. A key issue here, however, is the lack of capacity at the technical level, most commonly illustrated through faulty installations and maintenance of larger home systems involving separate components. To facilitate improved capacity for repair and maintenance EnDev plans to support the training of women technicians, simultaneously increasing employment opportunities for women and challenging perceptions on traditional gender roles.

### **Social sustainability**



The project's outputs and approaches are aligned with national targets and other sector interventions. It is a development of existing activities, which have been well received and supported, and refined to adapt to emerging needs. It transfers increasing autonomy in development of market solutions to the companies, in anticipation of the maturity of the market and the exit of EnDev support. Gender-focused interventions respond to an absence of provision in the market in a way that is likely to be ultimately beneficial to both men and women. LNOB approaches increase energy accessibility for the financially excluded, while also enhancing availability on the wider market (for example, as a supplementary product) and stimulating beneficial impacts on the market as a whole (such as the erosion of widespread availability of substandard and uncertified products). As the approaches targeted at underserved market segments are more widely beneficial, they are unlikely to provoke objection or unrest.

### **Exit & handover Strategy**

The core activities for picoPV and SHS are designed in such a way that the functions can be absorbed into or replicated by companies as they develop or continued by direct partnership with external partners (e.g. in terms of retail and distribution). Various activities including training and network strengthening are designed to help companies to develop their own capacities to the stage where they may eventually control these functions independently. The mid- to long-term goal is a healthy market for picoPV and SHS.

## **1.11.8 Gender Strategy and Safeguards**

EnDev has already mainstreamed gender approaches in its current programming: Women participation and empowerment is robust. Out of 431 SPG, over 400 are actively led by women. Out of 5,763 people employed, 4,579 (ca. 80%) are women. EnDev prioritises improvements in the vital day-to-day cooking predominantly carried out by women at home (practical need, demand side) through the promotion of the CM, which burns cleaner and saves firewood, time, and labour (in form of unpaid work). A sub-component focuses on access to ICS for social institutions, mostly schools and health facilities, where cooking is mostly done by mothers and female guardians respectively.

The new Chitofu 3in1 targets fish processors, out of which 80% are female.

Incorporation of gender mainstreaming approaches for solar interventions is being expanded. Solar reduces risk and extends access to education to women by lighting journeys or places of study outside daylight hours. Reducing use of candles and dry cell batteries also has positive health and environmental outcomes and reduces risks of fire.

**Gender transformative:** Clay work is traditionally a female task but EnDev encourages participation of men according to their abilities to improve the overall productivity of SPG. Production groups are predominantly female with control over their own production assets (clay source, tools, kiln, and storage space). Women allocate some roles to men, either as part of the SPG or more predominantly, hired for piecework (e.g. clay collection, clay transportation, and clay stomping). Therewith, it has a gender-transformative impact in regard to gender equality and women empowerment. The stove business serves as a launching board to engage in business and enhance women entrepreneurship. Women are empowered to make strategic choices and generate an own income (some women earn more than men in rural

areas where employment options are limited). Women are also engaged as last mile distribution retailers by way of becoming stove agents/promoters in the harder to reach rural areas, earning a commission on stove sales made. Income generated by both production and retail activities is used for various home improvements, education needs, spin-off businesses, and participation in VSL groups.

While fishing is carried out by men, the processing of the fish on the lakeshore is traditionally a female-led task, although some women entrepreneurs employ male workers. Therefore, both men and women will benefit from the convenience of the Chitofu 3in1 which saves time and reduces exposure to heat and smoke.

The solar component of EnDev's intervention has traditionally been gender aware, including with the strong representation of women among the leadership and staff of its implementing partner, and the positive consequences of energy access interventions for women. Under this project, however, gender specific interventions have been devised to actively promote gender equality. These include market research to facilitate increased market understanding of women consumers' motivations and barriers to access, enabling companies to better respond to these, and the training of women technicians to fill the capacity gap for effective repair and maintenance of systems, thereby challenging gender norms.

**Strategic gender needs:** The programme focuses on the gender-responsive productive needs in the production of the ICS as an income generating activity. Although production groups are led by women, when it comes to financial decision-making from stove proceeds, it becomes a men's affair. EnDev will address this to encourage more women to take up financial responsibility by way of financial literacy trainings facilitated by implementing partners. Access to gender-specific tools to improve production steps along the entire production process (e.g. where physical strength is required, women are empowered to carry out these tasks, e.g. with the help of paddle moulds to shape the stoves with less physical force; reduce the need for firewood through energy efficient firing kilns, which generally reduces the burden and risk of exposure to gender-based violence during collection).

EnDev will incorporate messaging that relates to both men and women in ICS and solar awareness creation. This will address gender-focused benefits of improved technologies as they relate to health, socioeconomic status, agricultural outputs and energy requirements of both genders. These efforts are linked outcomes stipulated in the 2015 Malawi National Gender Policy, the 1987 UN Committee on the Elimination of Discrimination against Women (CEDAW) and the 2016-2020 Malawi Gender Equality Act Implementation Plan.

# 1.12 Mali

## 1.12.1 Summary and key data

Promoted technologies			
Summary of proposed interventions(s)	<p><b>Electricity (GIZ – lead implementer)</b>  <u>Demand oriented integral electrification</u></p> <ul style="list-style-type: none"> <li>Using technologies ranging from Pico PV to mini grid (lobby for grid) in a concentrated area to build basic electricity infrastructure that replies to demand of different villages and users, reaching structure and scale to enable investments;</li> <li>Technical assistance to national network clinics to overcome low lifetime/defects PV and cover demand efficiently, including training of technicians that deliver service at proximity;</li> <li>Market development Pico PV with quality and service guaranteed, delivering company specific support and awareness raising campaigns quality PV (pico PV and SHS) ;</li> </ul> <p><u>Reducing e-waste PV through repair &amp; recycling</u></p> <ul style="list-style-type: none"> <li>Initiating repair (beyond guarantee) and recycling with startups, &amp; pico PV companies using rural and centralised facilities;</li> </ul> <p><b>Access to electricity in vulnerable setting (NIS)</b>  <u>(Non market based) Electricity access in the north of Mali;</u></p> <ul style="list-style-type: none"> <li>aiming at villages with PU potential to enable favourable and autonomous development, increasing resilience and re-integration. NB: All villages shelter refugees (informal setting);</li> </ul> <p><b>Facilitating market development clean cook stoves (SNV)</b></p> <ul style="list-style-type: none"> <li><u>Expanding the pioneering market for improved household cook stoves</u> with key interventions aimed to improve the enabling environment (labelling) with a focus on demand creation and professionalizing supply in secondary towns.</li> <li><u>Developing market intelligence on productive use and alternative fuels</u> by researching biomass alternatives &amp; innovative technologies with focus on high wood consuming productive use.</li> </ul>		
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	88.480	People	<i>3.032 high tier (incl. third party financing). Incl. vulnerable setting</i>
Cooking / thermal energy for households	185.535	People	<i>Alternative fuels might be added following ongoing research</i>
Electricity and/or cooking / thermal energy for social infrastructure	173	SI	<i>Technical assistance 800 clinics, (300 in ex , including vulnerable setting.</i>
Energy for productive use / income generation	580	MSMEs	<i>38% lead by women, 20% new SME's in electricity</i>
Project period	01.01.2021 – 31.12.2024	Indicative Budget	5.000.000

### Introduction – historic development

EnDev- Mali started in 2007, bringing solar electricity to rural communities far from the grid in seventeen communes in three regions as support to the GIZ decentralisation program. A first experience with solar electricity was delivered in rural villages. Around the facilitated social infrastructure and battery charging station, solar panels started to find a market. As the demand for battery-charging reduced with improved access to solar panels (not yet installations), sales of Pico PV was added in 2013 to increase benefits for the stations and deliver quality PV to the population. In 2015 battery charging became so marginal that productive chains (cooling) were progressively developed to use electricity produced and reply to demand in collaborating rural communes. In 2016 a first mini grid with cost effective pricing was developed and EnDev started a more holistic approach on electrification, actively participating in donor platforms.

In 2016, the first 250 (diesel powered) mini grids in Mali, were realised and operated by 63 operators, different of size, capacity and skills. Many mini grids lacked technical and financial health, service stopped or came with limits. Donors developed programs for hybridisation. Few mini grids were transferred to the national utility without full compensation. In a political volatile situation (multiple governments after the coup d'état in 2012) the strategy for electrification was not decided upon. The enabling environment was poor. Only one Pico PV company was present in the market, technical know-how was limited on national level and especially in rural areas.

Seeking to enhance the enabling environment and aware of the necessity to increase both sustainability and efficiency of the electrification approach, **market development of Pico PV** was continued while choosing a concentrated geographical intervention area to facilitate investments. A vision for **integral electrification** was developed by EnDev in 2017, offering a new framework for electrification where cost effective operation becomes possible using complementary technologies to meet demand that varies village to village. The cercle of Baroueli was chosen as new intervention area. Reasonably populated/concentrated (230.000 people on about 1500km<sup>2</sup>), with important dynamic as well as small off-grid villages, high tension lines crossing, limited access to the grid for two villages and an otherwise rather representative state of electrification ( $\approx 18\%$ ); 2h ride from Bamako to facilitate follow-up.

In 2017, in the new geographical area, unelectrified off-grid clinics existed next to those with multiple donated installations; four light-switches next to each other, one lamp working.....

In Baroueli, the project started with the facilitation of social infrastructure to learn that sustainability problems the project had overcome, were actually still occurring everywhere at clinics. A program for **technical assistance to clinics** was elaborated with the national federation of clinics in 2019 and is executed since.

**Repair & recycling** was absent and through a call for an innovation funds, added to the approach in 2019, as necessity to increase sustainability for (Pico) PV appliances.

Meanwhile security became challenging in many parts of Mali. In 2013, after the coup d'état in 2012, large parts of the north of the country became instable as a result of armed conflicts/terrorism. Following positive experiences of EnDev in electrification in these circumstances in other countries, **electrification in vulnerable setting** was added as specific component in 2017 and executed by a Norwegian partner (NIS) present in the field.

Moreover, in order to increase learning-benefits of the international EnDev-program and knowing that only 5% of the population had access to **clean cooking**, a cooking component was added in 2019 and executed by SNV. Improved and alternative ways of cooking are eminent in the sahel country of Mali that is using a lot more wood that it can sustainably generate every year.

### 1.12.2 Theory of change (ToC) and state of market

#### Electricity

The Malian government is committed to stimulate rural electrification and use of renewable energy sources, with special focus on solar electricity. Solar electricity is supported by EnDev and emerging as main energy source in rural areas. Access rates to electricity in rural areas increased from 1% (Worldbank, 2000) to 18% (AMADER, 2015), revised at 12% in 2016 and recently reached 25% (World bank, SE4All 2018).

The electricity demand on the **national grid** is increasing with about 10% a year, making extension beyond the actual grid challenging for the national utility. An important Worldbank facility started in 2019 to deliver financial and technical support to the national utility. Interesting in that framework is that interconnexions as well as (private) solar plants gain in interest to *reduce production prices*. Thereby *positioning solar* as important national energy source, *attracting (new) private (international) operators* and increasing the number of high schooled technicians. Interconnexions include the option of rural electrification; still leaving the vast majority of rural villages, including those under/near the existing grid, unelectrified.

In rural areas, several (defect) **mini grids** are getting *hybridised* since 2017. About 25% of 250 mini grids is ready/engaged and service restarts or improves. Another 55% is in the pipeline. Know-how of solar/hybrid operation increases yet *sustainable operation* is still to be proved – financial management of diesel powered mini grids has been challenging and hybrids require even more (middle/longterm) planning with pression to reduce tariffs applied. EnDev considers this *an important risk*. A *revision of the strategy for rural electrification* is upcoming and multiple improvements can be applied as such. At present, private investments are mostly realised based on the availability of subsidies, *geographically spreading enterprises* in the vast country of Mali and reducing efficiency of growth. The *volatile political framework over the last few years* has not contributed to create a stable investment climate; 80/90% subsidies are common, while mini grid-extensions are rare. Installations are popular while operation is not; *bankable business-plans are lacking*.

The **Pico PV market** otherwise starts to develop with *pay & go* facilitating clients to obtain systems larger of size. More companies offer **solar equipment** in general as well. With (low quality) torches and solar products accessible at most (weekly) markets, access to electricity increases in rural areas yet low lifetimes (<6months) of PV installations continue to discourage clients. Repair & recycling hardly exists (unless for flashlights); **e-waste** is created. At over 250 clinics in the EnDev inventory, costs of repair nearly equal the cost of new electrification. *Quality of technical advice and assistance at proximity is lacking in rural areas*, significantly reducing sustainability. At-distance monitoring still comes with practical problems (costs, internet etc) and is hardly applied.

Meanwhile, the *northern part of the country is largely unstable; insecurity exists*. Internal refugees find place in and around existing villages/cities. The need for electricity-services (light at night, productive use etc) is present yet investments (by the private sector) in electrification-infrastructure are not yet evident – more good examples to be given.

In the above depicted and otherwise fastly developing electrification context, a single “technology-push” approach no longer appears an adequate response to existing challenges. Consequently, and in line with EnDev’s electrification position paper, EnDev Mali pursues a broad and generally demand-based electrification approach,

Please also see the Theory of change (ToC) below.

## Theory of Change - EnDev Mali (electricity)

<b>Impacts</b>	<b>Energising Lives - Social development</b> <ul style="list-style-type: none"> <li>- livelihood and health improves</li> <li>- learning environment improves</li> <li>- increased security for people and their belongings;</li> <li>- less migration (to cities and beyond)</li> <li>- reduced vulnerability and increased resilience; no-one is left behind</li> <li>- gender equality improved</li> </ul>	<b>Energising Opportunities - Economic development</b> <ul style="list-style-type: none"> <li>- expansion modern energy services in rural areas</li> <li>- healthy business climate for rural electrification (with specific public support)</li> <li>- increased income and development in rural areas , reduced poverty</li> <li>- higher employment rates rural areas</li> </ul>	<b>Energising Climate - Combating climate change</b> <ul style="list-style-type: none"> <li>- understanding of energy efficiency and use fo PV appliances - reduced/avoided GHG</li> <li>- circular PV economy initiated, less e-waste</li> <li>- strengthened climate change resilience</li> </ul>
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>- the enabling environment gets favorable with clear strategies and a good private sector implication</li> <li>- acces to modern electrification continues to grow in reply to demand</li> <li>- quality of PV products is guaranteed</li> <li>- public infrastructure improves in quantity (water, healthcare accessible for all)</li> <li>- acces to financing enabled in more mature market, to support PV companies and (PU) clients (pay&amp;go, loans PV) alike</li> <li>- business development energised is also sustainable (non polluting in other ways)</li> <li>- more women interested to work in the sector and to invest in PV</li> <li>- companies actively work to close the product cycle with clients, offering repair and recycling (stimulated by law)</li> </ul>		
<b>Outcome</b>	<ul style="list-style-type: none"> <li>- local communities continue electrification together with (national institutions and) private sector</li> <li>- increase of (job) opportunities for youngsters and women in rural/vulnerable areas with diversification SME's</li> <li>- public services in rural areas increase in quality</li> <li>- public and private parties invest in rural electrification with solid strategies and business plans</li> <li>- sustainable electrification towards reaching SDG's</li> <li>- increased feeling of security and new opportunities for sustainable business development in less stable areas</li> <li>- reduced and avoided PV e-waste, increased climate awareness</li> </ul>		
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>- Electrification strategy get's adopted by private parties, local and national institutions alike, scale is reached and contributes to development of local communes</li> <li>- Electrification replies to demand, creates new opportunities in local communities and contributes to stabilisation</li> <li>- network technicians gets experienced and facilitates companies (and public investors) to enter rural areas and areas with less security</li> <li>- sustainable operation of PV (and hybrids) is understood and requested, quality control initiated;</li> <li>- new business are created in rural areas;</li> <li>- Scale of demand and supply reached, bankable businessplans become possible</li> <li>- Entrepreneurship grows; private sector invests (with public sector) in rural electrification in effective way</li> <li>- Additional income for women (productive use, sales and repair PV)</li> <li>- Public services, clinics and maternities get better equipped and recruiting/keeping good staff gets more easy</li> </ul> <p><i>- to pass barriers, synergy in action is also assumed with externally financed extension grid connexions (multiple), grid-code (WB), hybridisation and new minigrids (multiple), nano/flexgrid (multiple), electrification clinics (WB, multiple), RBF Pico PV (WB), cartography (WB), humanitarian energy-access etc</i></p>		
<b>Outputs and results</b>	<ul style="list-style-type: none"> <li>- scalable strategy for demand based integral electrification (from grid to pico PV) with public and private parties</li> <li>- increased efficiency and effectiveness investments to enable higher electrification rates rural areas and clinics/maternities in particular</li> <li>- trained network of local technicians enables electrification</li> <li>- improved public/medical services become possible</li> <li>- Improved awareness clients; higher demand for quality products&amp;services gets served in rural areas (SI, HH, PU)</li> <li>- Repair &amp; recycling initiated and integrated in (inter)national strategies to increase sustainability PV electrification</li> <li>- No-one is left behind; investments in last mile and unstable areas are stimulated</li> <li>- women get more involved in the sector</li> </ul>		
<b>Key interventions</b>	<b>Supply</b> <b>Demand based integral electrification</b> <ul style="list-style-type: none"> <li>- electrification with complementary technologies (tier1-5) to fit demand in limited geographical area (linking demand to sustainable supply)</li> <li>- co-investing in development mini/nano-grids + lobby to serve demand with funding others</li> <li>- facilitating lease purchase PU, pico PV + lobby pay&amp;go</li> <li>- integrating grid as (externally financed) option in vision for electrification</li> <li>- Market development quality PV and Lighting Global certified in rural areas (linking demand to supply)</li> <li>- Training business skills pico PV companies and women cooperatives or other in-kind support at request</li> <li>- Training of local (female) technicians with regional coverage (network serving clinics and businesses) and specifically including women (cooperatives)</li> <li>- Co-investing and executing installations at clinics with contracts for maintenance</li> </ul> <b>Electrification for resilience in unstable areas</b> <ul style="list-style-type: none"> <li>- training local technicians</li> <li>- investing in hardware with operation &amp; maintenance assured by private company/local technicians</li> <li>- identification sales points (pico) PV with companies</li> </ul>	<b>Demand</b> <b>Demand based integral electrification</b> <ul style="list-style-type: none"> <li>- inventory demand profiles villages in intervention area (linking supply to demand)</li> <li>- facilitation productive use (requested by women) with lease purchase and promote acces to pay&amp;go to overcome price-barrier</li> <li>- awareness campaigns in Baroueli and beyond to explain full range of quality PV solutions</li> </ul> <b>Repair &amp; recycling</b> <ul style="list-style-type: none"> <li>- increasing confidence in PV solutions with repair/extended lifetimes</li> </ul> <b>Electrification in vulnerable setting</b> <ul style="list-style-type: none"> <li>- overcome security barriers to identify demand</li> </ul>	<b>Enabling environment</b> <b>Demand based integral electrification</b> <ul style="list-style-type: none"> <li>- development new strategy for electrification calanifies investment framework (grid/off-grid) to reach synergie and scale</li> <li>- private parties develop cost-effective businessplans and acces to financing is enabled as such</li> <li>- endev discusses strategy and lessons learned with local and national partners to enable continued improvement</li> <li>- local communes manage decentralised revolving funds small of size and continue to invest in electrification</li> <li>- strategy for investments in sustainable electrification clinics based on demand and state of electrification confirmed in the field</li> </ul> <b>Repair &amp; recycling</b> <ul style="list-style-type: none"> <li>- initiating debate to include recycling in international quality standards (pico PV)</li> <li>- training technicians on repair and collaborating with private sector to initiate collect/recycle</li> <li>- guiding winner solar competition in PV and battery recycling</li> <li>- awareness and advice companies &amp; strategy national level</li> </ul> <b>Electrification in vulnerable setting</b> <ul style="list-style-type: none"> <li>- facilitating acces to know-how based on in-the-filed-experience to overcome security barries and interest both donors and private parties to join (humanitarian as well as commercial)investments</li> </ul>
<b>Barriers</b>	<b>Supply side barriers</b> <ul style="list-style-type: none"> <li>- The national utility is not able/interested to serve rural villages near to grid as demand cities unsatisfied</li> <li>- Private (mini-grid) sector is organised inefficiently, geographically dispersed (depending investment programs), lacking scale</li> <li>- Most investments/subsidy are technology- instead of demand focussed and aimed to reach short term results;</li> <li>- Lacking (quality of) business plans/entrepreneurship; upscaling difficult and limited offers to reply to demand</li> <li>- Many dynamic rural villages without electricity; high initial investments</li> <li>- Reaching last mile and instable areas comes with higher risk and relatively higher expenses</li> <li>- Technical capacities limited, especially in rural areas</li> <li>- very few women engaged</li> </ul>	<b>Demand side barriers</b> <ul style="list-style-type: none"> <li>- Lack of resources, price determines purchase; many systems have low quality and lifetime</li> <li>- Understanding/appreciation PV lacking, quality often not recognised or asked</li> <li>- Vast country with dispersed population, scale of demand lacking is several zones;</li> <li>- Demand exists in instable areas and areas with insecurity with population in need of resilience</li> </ul>	<b>Enabling environment barriers</b> <ul style="list-style-type: none"> <li>- poor policy framework; outdated strategy for rural electrification</li> <li>- low level of private sector organisation (lack of coordinated negotiation)</li> <li>- limited follow-up/appropriation/effectiveness of investments in the field; lack of quality information on best approaches</li> <li>- limited acces to financing for private sector (financing technologies instead of strategy/business plans);</li> <li>- no quality control; all products can be sold resulting in lots of trash</li> <li>- repair&amp;recycling hardly organised and sustainable market development limited as such</li> </ul>
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>- Solar electricity / acces to modern energy services is necessary to develop rural electrification and should be in line with demand to be sustainable</li> <li>- Lacking vision and capacities to develop sustainable rural electrification</li> <li>- Lack of bankable and scalable businessplans for outroll modern energy services, lacking entrepreneurship in the specific domain</li> <li>- The risk of (private) investments is relatively high in many parts of Mali</li> </ul>		
<b>Root cause</b>	<ul style="list-style-type: none"> <li>- electricity demand is growing faster than electricity acces on national level</li> <li>- priority in electrification is given to the national utility that is not able to cover rural areas</li> <li>- market development in rural areas is confined, the enabling environment lacks</li> <li>- unstable security situation in parts of the country and by times also an unstable political situation</li> </ul>		
<b>Core problem</b>	<b>Electrification services do not cover electrification demand</b>		

Anr



## Cooking

The market for clean cookstoves in Mali is dominated by low tier stoves. As per WB data, less than 5% of the total population has access to clean cooking in 2018. In the past many awareness raising has been done in Mali (among others by a World Bank programme) and there is quite some understanding among the population on the concept of improved cookstoves. Capacity to produce ICS exists, in particular by local artisanal tinsmiths, though quality is an issue as the technical requirements are often not respected for reasons of production costs and competitive pricing. Artisans also make changes on stove models without testing the resulting performance. Many stoves on the market thus are unjustly considered as ICS. This creates bias in the interpretation of the status of the market.

In Bamako there are two stove producers who produce stoves with a ceramic liner. Quality is less an issue with these stoves as they are subject to Gold Standard carbon finance and are regularly verified. The demand of these stoves is high and for reasons of non-saturation of the Bamako market and the fact that both carbon PoAs are only valid for stoves sold/used in Bamako, there is little appetite for these companies to expand their markets outside Bamako. As a result, households residing outside Bamako are almost fully dependent on the artisanal stoves.

The enabling political environment is poorly developed, but recently some developments are taking place:

- In the first place, with support of EnDev, the process of the establishment of a quality label is in progress, supported by the relevant government agencies, the Mali Alliance for Clean Cooking (M-ACC) and civil society organisations. The label will address the quality issue in order to protect the customer and as it will be a graded label, it will also motivate companies to innovate and distribute higher tier stoves.
- Secondly, there is good appetite by the Malian Government to explore alternative biomass based cooking fuels. In particular bio-ethanol is high on the agenda of ANADEB, but also biomass briquets from agricultural residues. A National Bioenergy Plan is currently being elaborated.
- Thirdly the M-ACC, though not yet strongly organized, is taking up their role to lobby for putting cooking higher on the national agenda and for better regulating the sector.
- Finally, a number of private companies are moving forward and have significant growth potential. One of the ceramic liner stove producers (Katene Kadji) is currently investing in a semi-industrialized unit which can triple their current production. Another company (Yiriimex) has developed SI and PU stoves which are expected to be put in the market soon. Several companies (Yiriimex, Togo Tilé, Aircom) are also developing/innovating higher tier (2/3) household stoves.

Challenges remain in terms of testing. Capacity to measure thermal efficiency is more or less available, though with challenges on timelines and report quality. Other tests (including emissions) are not available in Mali because of lack of equipment.

In terms of alternative fuels, AECF has funded two companies to pilot bio-ethanol cooking, in collaboration with ANADEB. EnDev has been asked to also support this initiative. PUM and

EnDev are collaborating in research, at the request of the Cotton Oil Producer Federation (FENAPHAB), on the potential of the use of cotton stems (pressed into briquettes) to replace wood in the cotton-oil processing industry (ToC below).

Theory of Change - EnDev Mali - Clean cooking			
<b>Impacts</b>	<b>Energising Lives - Social development</b> - reduced vulnerability and increased resilience; - quality of livelihood and health increases - gender equality improved	<b>Energising Opportunities - Economic development</b> - expansion of customer-oriented improved and clean cooking business over the country - healthy business climate for clean and improved cooking - increased income (supply side and PU) and savings (demand side)	<b>Energising Climate - Combating climate change</b> - reduce GHG emission by saving on fuels - reduce deforestation and desertification by less use of woodfuel - strengthened climate change resilience
<b>Assumptions</b>	A well regulated sector will lead to a better investment climate A strong MACC backed up by an inclusive stakeholder platform will increase political focus on clean cooking		
<b>Outcome</b>	Engagement of a professional customer oriented supply sector Clean cooking will come higher on the political agenda Engagement of a strong demand for quality ICS		
<b>Assumptions</b>	- Focus on quality and performance of stoves, including quality control will motivate suppliers to market higher performing stoves A more regulated sector will attract professional and customer oriented supply actors Higher customer awareness will result in more interest and more quality claims of customers Simple low-cost solutions in rural settings will trigger more interest in clean cooking solutions by rural populations MACC, supported by the inclusive platform will advocate for putting clean cooking higher on the political agenda		
<b>Outputs and results</b>	<b>Supply</b> Professionalisation of the private stove sector Increased availability of quality ICS outside Bamako Gradual increase of the supply of alternative fuels (bio-ethanol and briquettes)	<b>Demand</b> Households aware of benefits of ICS and clean cooking	<b>Enabling Environment</b> Operation of an inclusive platform on label attribution and quality control, led by MACC
<b>Key interventions</b>	<b>Supply side</b> (result based) Business development support to stove producers and stove suppliers (household and PU) (result based) financial support to stove suppliers to boost distribution outside Bamako (mainly households) Follow-up on bio-ethanol and briquette pilots, the latter mainly targeting PU, the former targeting households Promote the integration of women in the distribution chain	<b>Demand side</b> Behavioural Change and marketing campaigns to promote ICS Behavioural change campaigns in rural settings on low-cost solutions for improved cooking (leave no-one behind)	<b>Enabling environment</b> Develop and apply a graded labeling system, including a quality control mechanism, managed by stakeholders Improve testing capacity AER Capacity building of MACC
<b>Barriers</b>	<b>Supply side barriers</b> Limited focus on product quality by artisanal stove producers The Bamako market not saturated, more professional companies in Bamako lack the motivation to set up distribution network in the country The market basically being led by price, entrepreneurs lack the incentive to innovate Limited number of women in the supply chain	<b>Demand side barriers</b> Understanding/appreciation ICS lacking, quality often not recognised or asked Limited demand in rural areas, also because wood is 'freely' collected	<b>Enabling environment barriers</b> Poor policy framework; no strategy for cooking energy Low testing capacity Mali Alliance for Clean Cooking exists, but is still unexperienced No transparency neither control on product quality and performance
<b>Assumptions</b>	Without end user subsidies or payment facilities, a large part of the population will not be able to access ICS		
<b>Root cause</b>	Limited active demand for ICS does not allow the private sector to develop and implement an effective marketing approach Frail business case for localized production and sales (outside Bamako) Customers purchase ICS without information about the quality of ICS Limited ability to pay by large part of the population		
<b>Core problem</b>	Adoption rate of ICS is very low, in particular outside Bamako		

### 1.12.3 Transformative character

#### Demand oriented integral electrification

Through its main electrification component, EnDev Mali aims to broadly support demand-based electrification, facilitating supply of electrically driven services to households, social infrastructure and facilities for productive use at appropriate service levels through a range of activities, and often in collaboration with various partners. The key intervention zone for this strategy is the cercle of Baroueli. Key activities, the necessity of which follows from the ToC

analysis (of which the format came with limits considering the broad coverage of project components), include:

### **Market development**

The demand-based approach is new in Mali where most investments thus far have been technology driven. It promotes a full range of complementary electrification technologies (from grid to pico PV) to fit demand for electricity in a cost-effective and sustainable way and aims to increase access rates in a limited geographical area instead of widely spread individual villages. The concentration on the specific region of Baroueli enables solid information on the state of development, provision of information for clients, private sector, local and national authorities as well as donors. This enables leverage of synergies for effective and efficient electrification via a local self-sustaining market development, fitting demand and reaching supply at a larger scale. Three companies already seek to invest with EnDev; challenge is to assure that mini grid operators extend services in the area – a first example of a mini grid operator starting a new collaboration with Flexgrids (and SHS) in Baroueli is set as example;

Outside the Baroueli area, EnDev generally stimulates market development for quality PV. Assistance in business development for Pico PV companies is given with market information (demand-profiles, effective communication), training and/or awareness raising in local communities to explain quality versus non-quality (pico) PV while establishing a network for supply. At present, demand for more important systems for productive use (not yet covered by pay&go) starts to develop. EnDev also trains local technicians to deliver service at proximity for clinics (covering sanitary districts and geographical regions). The presence of schooled technicians facilitates companies (beyond pico PV) to enter rural areas (all technicians continue -better quality- installations after training);

### **Economic development**

Productive use develops rather automatically in already dynamic villages in Mali once connected to a (min)grid. Electrification by mini grid is actually planned in nine of those larger villages (seven of which with TA EnDev only). The private operator of two villages facilitated with direct funding of EnDev, shares benefits with the local authority of the commune to enable them to finance further electrification. This is never done yet. Moreover, all communes manage (limited) revolving energy funds with assistance of EnDev to facilitate lease-purchase of PV installations for productive use (awaiting pay & go). This is notable in a context where decentralisation of public funds is not yet evident. Active involvement of village committees enhances transparency.

Direct facilitation of productive use is limited to the intervention area of Baroueli. Beyond, awareness campaigns of EnDev aimed at market development Pico PV, reach productive users. Registration of productive use at Pico PV companies is still to be reinforced. Based on sales figures analysed by EnDev, a minimum of 10% of the clients uses the SHS size Pico PV systems in a productive context (mostly shops). More extensive pay&go facilities are expected to further extend productive use, once they enter the market.

### **Social Development**

Decentralisation of the state is considered important for peace and development in Mali. EnDev applies this in her approach for integral electrification in Baroueli, collaborating

directly with local communes. The project guides communes in their management of the electricity infrastructure promoting transparency and seeking to support autonomy. Social institutions in the intervention area (municipalities, clinics and maternities) have already been electrified or received technical assistance by EnDev to improve existing installations and thus services.

Important part of this activity is to increase the sustainability of PV installations at rural clinics and maternities in collaboration with the national federation of clinics (FENASCOM), also outside the Baroueli area. The sustainable electrification approach as promoted by EnDev is required to increase quality and quantity of health care services while gaining in efficiency of funding. The focus on public health care, is expected to also influence the general sustainability of installations positively, while inclusion of maternities specifically serves women and children. Meanwhile access to light and other facilities through SHS and certified Pico PV contributes to improve living standards.

### **Poverty alleviation**

The approach seeks to leave no one behind and explicitly includes smaller villages/settlements far from the grid. Central as well as local level village meetings (please see gender chapter) are highly appreciated as the project shows interest in the local circumstances of the target groups and enables know-how and access to electricity-solutions.

Outside Baroueli, local village meetings are used to reach the last miles with the Pico PV program, offering feasible options for basic electricity demand. Furthermore, the electrification of clinics is aimed to leave no-one behind and includes local maternities as well as health care services in less secure areas.

### **Reducing e-waste through repair and recycling**

As part of the broad electrification strategy, EnDev addresses some end of life-cycle issues or rather strives to prolong life cycles by proper repair and maintenance therewith also reducing e-waste:

### **Market development**

The availability of options for repair creates confidence and stimulates demand. Moreover, with PV developing, options for repair and recycling should be put in place to allow full market development in a responsible way. At present, only a recycling chain for regular (car/solar) batteries exist. Partnering pico PV companies offer repair, also using technicians trained by EnDev. Recycling is only starting;

### **Economic development**

Effective experience with repair and initiation of a recycling network, will facilitate local knowhow and inspire businesses. EnDev focusses on the E-waste related to PV appliances, including fridges in a context where waste-management hardly exists. An e-waste competition and training on repair of fridges already took place. Pre-industrial recycling of solar panels is delivered by the startup winning the e-waste competition.

### **Social development**

Full development of the solar sector without increase in sustainability and without repair and recycling taking a lift will have negative environmental impacts and might also impact health and quality of life. The necessity to increase quality, to realise systems that can be and are

repaired is eminent and explicitly promoted by EnDev. Initiated in collaboration with start-ups and social impact companies, repair & recycling is to be included as part of economic development with reduced e-waste and resulting environmental & health issues as social benefit.

### **Poverty alleviation**

Local communities can help in paid collect (at present with lead-acid batteries) yet incentives are generally lacking. Inclusion of 'e-waste' as subject in (inter)national standards seems necessary to really develop the chain.

### **Access to electricity in vulnerable setting**

In the unstable north of the country, and adhering to its Leave No One Behind principles, EnDev developed some non-, or just partly, market-based electrification activities:

#### **(Attempts at) market development**

Market development in unstable settings is not evident yet many dynamic villages with high demand for electricity do exist (and grow with additional internal refugees). EnDev collaborates with the private sector and with locally trained technicians for follow up. With know-how and presence of EnDev in the field, other donors and the private sector can be inspired/facilitated (TA) to enter and/or co-develop electricity-infrastructure. Dynamic villages used to flourish with tourism and electricity replies to a real demand;

#### **Economic development**

Light at markets contributes to security while PV for productive use contributes to develop new or more efficient productive activities, increase revenues and potential for agricultural outputs (pumping, conservation etc) thereby contributing to resilience.

#### **Social development**

The availability of light contributes to a feeling of security. Light at marketplaces helps to keep them accessible at night. Reduced stealing is observed but not data is available. The execution of electrification in multi-ethnic villages and through an inclusive process also helps to create a more positive social framework for dialogue and problem solving. The GIZ intervention at clinics also includes vulnerable settings.

#### **Poverty alleviation**

The North of the country is deprived of many services, except for urgent humanitarian help, re-integration programs and projects to improve dialogue. Project execution in this remote area is difficult but promising to reinforce stability and collaboration between public and private partners.

### **Clean cooking**

#### **Market development**

The market development scorecard exercise in July 2020 shows that the sector is currently for a large part in the pioneering phase. Household cooking in urban and peri-urban settings in Mali is mainly done with wood and charcoal and major focus will be on increased access to improved wood and charcoal stoves. At the basis, one of the main barriers for adoption of

ICS in Mali is the weak sector organisation/enabling environment. In 2020 elaboration of a (voluntary) label has been initiated by EnDev in collaboration with major stakeholders including AMADER and the Mali Alliance for Clean Cooking. In order to push the supply side to the expansion phase, incentives will be created to expand the geographical scope and to innovate on higher tier stoves. This will be done by (result based) business development support (BDS), and by communication campaigns on the additional benefits of stoves with a higher score on the (graduated) label.

### **Economic development**

For many agro processing activities requiring heat, huge quantities of wood fuel are used. Examples are (cotton) oil production, milk pasteurization, traditional beer brewing, bread baking and food preparation in restaurants. EnDev in collaboration with PUM have done some research on the potential of biomass briquets, in particular cotton stem based, destined for the cotton oil industry as substitute of firewood. The company Yiriimex is also very involved in R&D on briquets. Productive users are the prior prospect for the development of a market for briquets. EnDev will continue to gather market intelligence and doing pilots in this market segment. EnDev's contribution to these pilots will include technical assistance and risk mitigation for the entrepreneur.

### **Social Development**

Reduction of the use of wood will mitigate the environmental degradation that is going on in Mali and which is reducing the quality of life and the resilience of mainly rural population. In the longer term a transition to cleaner cooking systems (including cooking with bio-ethanol) will also have a positive impact on health for women and children in particular.

### **Poverty alleviation**

While the main focus is on market development of ICS in urban and peri-urban settings based on clear business cases for companies and end-users, the business case in rural settings is less convincing, basically because wood is freely collected and women drudgery (wood collection) is culturally hardly recognized. In order to address this, the action research started in 2020 on the placement of rocks between the three stones stove, saving around 30% of wood consumption will be continued through pilots and scaled according to a strategy that will depend on the pilot results. This is done very efficiently in synergy with the Pico-PV component implemented by GIZ.

## **1.12.4 Collaboration**

### **Electricity**

#### **Sector alignment**

The national framework to promote energy access is given in the 'Programme d'Action National d'Energie Durable Pour Tous' (SE4All) and the 'Plan d'Action National d'Energies Renouvelables' (PADER). The final version of both plans dates from 2 November 2015. The action plans define a global framework and are mainly aimed to increase the number of people with access to electricity in general (70% by 2036) and in rural areas in specific. A focus on renewable energy is given, in these strategies and NDG's. PV is explicitly included as intervention area. The national strategy and regulation are otherwise planned to be revised in

upcoming years. The necessity for off-grid solutions at middle-long term has been confirmed in this process and PV is presented as focal technology for off-grid access. A clear vision on the actual and prospected state of development in rural areas does not yet exist.

EnDev is well aligned with actual strategies within the sector and contributes in their execution. A direct collaboration with the national directorate for energy DNE assures that new developments are known and integrated into the EnDev implementation strategy where feasible and lessons learned by EnDev are easily shared as well.

Sub-results like job-creation, decentralisation (collaboration with local communes in Baroueli), improved health care, services in the North and the inclusive approach in general, also contribute to objectives in other sectors in Mali and hence allows EnDev to contribute to other sector targets.

### **Implementer base**

The implementer base differs between the components. In the demand oriented integral approach, the project seeks to collaborate with a maximum amount of partners in order to reach objectives in the field. In Baroueli this includes the partners of AMADER/AER (World Bank, AfD, BOAD, BAD, Abu Dhabi Fund for Development) and the national utility EDM (World Bank, AfD, EU), as well as donors directly supporting the private sector (SIDA, World Bank) and a variety of NGO's. Two private partners already engaged in the collaboration (one with REACT/SIDA and one is still seeking additional financial support (at GIZ/KfW and elsewhere) to leverage private funds.

In seeking sustainable electricity solutions in rural areas outside Baroueli, collaborations with all partners of FENASCOM (federation of clinics) that (seek to) electrify health centres (generally about 3 different organisations per region) will be pursued. Though the collaboration with the national energy directorate, an action-plan for electrification of clinics is pursued that other actors can use to invest. The practical know-how of the state of electrification already results in collaborations with GERES/AfD and a prospected collaboration with the WB (agreement on TA EnDev yet execution/funding yet to be clarified).

For the training of technicians EnDev includes training facilities of which only few exist (even more so taking into account corona measures) and add practical modules to their curricula (dimensioning, installation, depreciation, maintenance explained and used in practice). By doing so, impact goes beyond direct financing of installations. The Pico PV component collaborates with companies offering certified Pico PV solutions and specifically includes women groups for awareness and commercialisation. The Worldbank delivers RBF at present reaching diversification of products in the market while know-how of EnDev facilitates entry of the rural market.

The e-waste component links to impact hubs and collaborates with local technicians. No other donors invest in this market segment yet, but the EU and DEZA invested in a start-up company that seeks to deliver options for collection and treatment of e-waste. Potential future partnerships will be explored.

In the component facilitating electricity access in vulnerable settings there is cooperation potential with multiple donors who invest in the north of the country on humanitarian grounds and/or specifically seeking to electrify opportunities. Projects for streetlights are realised (often by MINUSMA-Norway). The delivery of other electrification options is being initiated (or



re-launched) as some donors did invest in electrification in the north before the crisis (Switzerland, World Bank, AfD known thus far).

Besides investments in technologies like mini grids, investments in the enabling framework are also expected with amongst others the grid code and strategic cartography planned by the World Bank. Cartography is crucial to EnDev as it will clarify the strategy to be adapted in the field. The grid code, defining conditions for transport/connexion on the grid, is being developed and might bring a solution for villages near to the grid in areas licenced to the national utility yet without their prospected investments for electrification.

### **Leverage**

The activities provisioned for EnDev-Electricity, are aimed to create a maximum of spin-off. The integral approach to electrification is simple and strategic at once and at present, with private parties seeking to join EnDev in Baroueli with multiple technologies, it is estimated that the approach reaches interest and leverage on national level. Thereby not only creating a more attractive investment climate in Baroueli but also beyond. Investments planned in mini- and flex grids in Baroueli, currently approach 4mio EUR and leveraging at >400%, not taking into account other technologies. This is planned to double with public/private projects in the pipeline, before the end of the project in 2024 (not yet included in quantified results).

The sustainable electricity solutions in rural areas contribute in multiple ways. First of all, to make investments effectively sustainable instead of realising continuous re-investments. This understanding and application is crucial for national level development and will save households, social infrastructure and productive users money. Moreover, the network of technicians realises installations and serves clients and the private (as well as public) sector as such, realising sales figures of at least 2mioEUR a year. Customised company support in the Pico PV sector further creates spin off reaching 15mio in sales figures (this will also depend access to financing for increased pay&go). Investments facilitated by the government (with other donors) and the private sector through the presence of EnDev in vulnerable setting, are estimated to reach at least 10mio EUR.

Repair & recycling is aimed to initiate this sector and a first start-up company already explicitly includes PV. Quantifying e-waste is still a challenge and necessity for other companies to enter the market. To experiment this, EnDev starts collect in Baroueli in 2021.

### **Nexuses**

The overall intervention of EnDev Mali is in line with the Malian Intended Nationally Determined Contributions (INDC, September 2015), as part of the U.N. Framework Convention on Climate Change. Among others, it intends to reduce CO2 emissions and increase energy efficiency. Actions to increase the amount of renewably produced electricity are included as well as actions to improve access to clean energy solutions. Other nexuses include the agricultural sector (facilitating productive use by improved storage, irrigation, transformation of outputs), the health sector (electrification of clinics in line with demand and including additional services if required) and decentralisation sector (working in direct partnership with communes/cercle and with them co-financing electrification).

### **Clean cooking**

## **Sector alignment**

In accordance with the new “Economic Recovery Framework for Sustainable Development” for Horizon 2023 (CREDD 2019-2023) adopted in 2019, the government of Mali aims to “Meet the country's energy needs in quality, quantity and at the lowest cost” and “promote the use of innovative technologies that respect the environment”

Specifically, , “actions related to the reduction of demand for firewood through massive savings (improved stoves) associated with the transition from charcoal to butane / briquettes / pellets / bioethanol / solar, and combined with measures to improving the quantities of firewood production would put the biomass sector of Mali on the path of sustainability” is a priority in the Malian energy strategy. The creation of ANADEB (National Agency for the promotion of biofuels) is one of the results of that policy direction. ANADEB is currently elaborating the National Bio-energy Plan.

## **Implementer base**

The Mali Alliance for Clean Cooking (M-ACC) is a young but emerging actor in the sector gathering a good number of private actors in the sector. It has been decided by all stakeholders (including Government agencies and civil society organisations) that M-ACC will manage the label (attribution, monitoring and control) in close collaboration with AMADER and initially supported by EnDev. Beyond this specific support to M-ACC, EnDev will also support M-ACC in a broader way in terms of (demand based) capacity building (e.g. institution building, leadership, advocacy, resource mobilisation), and with some financial support for operations. In line with learnings and recommendations from the clean cooking sector support report by RVO<sup>54</sup>.

In addition to AMADER, responsible for domestic energy, other main government actors are AER, responsible for testing and R&D in the RE sector, and ANADEB who has the mandate to valorise biomass in general. The National Directorate for Energy (DNE) covers all three aspects and is more focused on the national energy strategy. During the project, we will closely collaborate with these four leading Government agencies in the clean cooking sector. Besides, the Malian Agency for Standardization and Promotion of Quality (AMANORM), has an important role in the process of labelling and standardization.

With regard to the initiation of a transition to alternative cooking and heating fuels, a collaboration exists with PUM and the Federation of cotton oil producers (FENAPHAB) on supporting the development of briquetting of cotton stems for fuel in the cotton oil production process. Action research in cooking with bioethanol is done in collaboration with ANADEB and the AECF fund.

CCA in collaboration with ISO and EPA started a series of online trainings in 2020 on standards and testing for Francophone countries. Several public and private actors from Mali are participating in these trainings. The results will contribute to the step from label to standard and to the testing capacity in Mali and the West African region (CCA and partners are advocating a more regional testing approach).

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<sup>54</sup> <https://english.rvo.nl/sites/default/files/2019/10/End%20of%20program%20report%20Clean%20Cooking.pdf>

### **Leverage / spin off**

Households (and SMEs) will buy the improved stoves through a market-based approach without any subsidy. The programme resources will increase economic activity in target markets and create jobs as enterprises go to scale. Households and SMEs will save on fuels with ICS, which gives them the opportunity to invest.

The current intervention zone is basically the south and west of Mali. With the label EnDev is developing in an inclusive process, a sound basis will be in place to develop the market also in the rest of the country (with government support or with support from EnDev or other NGOs). A more regulated sector (including label) can also attract new actors to the sector, increasing competition and choice for the customer.

Eventually, with the extended geographical scope, current or new carbon projects could be extended or new ones created for the use of ICS in other geographical areas than Bamako only.

### **Nexuses**

The project has strong interconnections with the forestry sector as deforestation is a serious item in Mali, with only 3,8% of forested land remaining. In 1995, harvesting of wood for energy purposes was estimated at 5 million tonnes. In 2011, this doubled to 10 million tonnes per year due to population growth and massive orientation towards charcoal as cooking fuel. Regeneration capacity is estimated at 7 million tonnes per year. Market development of efficient wood and charcoal cooking appliances and a transformation towards alternative biomass fuels are contributing to a more balanced forestry sector.

According to the NDC (2016) between 2007 and 2014, GHG emissions from energy production and consumption increased evolved from 3,434 kTeq CO<sub>2</sub> to 5,268 kTeq CO<sub>2</sub>.

The residential sub-sector is responsible for 82.20% of significant emissions from the energy sector in 2012. This is mainly the consequence of the increased consumption of biomass, in particular fuelwood and charcoal. The application of energy efficiency associating the rational use of energy, saving of energy and energy control should allow a significant decrease in GHG by 2030.

## **1.12.5 Modalities**

### **Electricity**

#### **Approach**

In line with EnDev's electrification position paper, EnDev in Mali has a demand based "integral" electrification approach. It thus strives to broadly address (remaining) hurdles in providing appropriate electrification for different user groups, at appropriate tiers. Including all technologies from grid to pico PV, this primarily is executed in a limited geographical (pilot) area - Baroueli (230.000 inhabitants) in collaboration with national and local public and private partners. EnDev invests directly, lobbies for more public and private investments and delivers technical assistance adding what is necessary to give proof of concept for sustainable development and operation. Activities that are expected to leverage investments and increase the electrification rate at the same time are pursued.

To energize change beyond Baroueli, the project also replies to specific needs identified in the field. As such, focus is given to Pico PV/pay&go requiring market development (know-

how market entry rural areas, awareness campaigns) and to rural health care in need for sustainable electrification.

Practical training of technicians assuring coverage for the network of clinics is proceeded with installations of maternities (rather simple yet effective). Trained technicians are contracted by clinics to install/maintain installations and are also actively linked to household/productive demand as expressed during awareness meetings. The approach for clinics requires multiple partnerships while required investments are relatively high given the poor state of many such installations

Another specific element of the approach is the intervention in vulnerable settings in the north of the country. The approach chosen by NIS is one of extensive and inclusive preparation, fast delivery and long-term follow-up – beyond the project duration. Realisation takes place within 2,5 years, whereas the rest of the EnDev intervention is planned over 3,5 years. More details are to be found below.

## **Activities**

### Demand oriented integral electrification

Information about the current state of electrification and needs for development have already been obtained and shared when occasions for investments arrived. In exchange with the national directory, the strategy is elaborated at present – for them to follow up upon it as part of a pilot and way to attract (more) investors. Collaboration takes place with the national energy directory, covering the national utility, AMADER in charge of rural electrification, as well as AER in charge of few donor-programs for solar and mini grids.

Planned activities executed by EnDev consist of:

Strategy paper on integral electrification discussed with national directory, cercle, local communes, private sector to reach appropriation of approach while including lessons learned thus far. Another strategy paper is prepared at EnDev headquarters;

Co-investment in village-grid allowing to connect villages (on grid/mini grid). Two villages with direct funding of EnDev will be finalised by May 2021 (ownership commune with delegated operation for 15yrs), nine other mini grids to follow (with AER and contract of AMADER). Two pilot developed with Flexgrids to serve villages not immediately apt for mini grids (too small). The latter with a mini grid company, extending its technical service and enabling evaluation of approaches;

Lease-purchase for productive use (50 PU realised in first year) with revolving communal funds (established by EnDev and commune) to reach smaller villages. Trained operators selected by communes correctly install and maintain installations. Lobbying for private sector pay&go ongoing;

Quality SHS and pico PV: sensibilisation campaigns and active stimulation with local sales points of private operators. Including lessons learned with 'solar libraries' AMADER;

Energy efficiency: sensibilisation part of all activities;

Repair & recycling; training technicians for repair took place and will be reinforced, also facilitating local points for collect once recycling network is established, batteries already being recycled with private parties;

Training: selection and practical training of technicians (special facilities to include female technicians) to cover the national network of the federation of public clinics (FENASCOM), while linking them to (pico) PV companies for further scale;

TA clinics delivered through network of technicians; identifying state and exact demand for electrification, meanwhile explaining sustainable electrification (quality and funds necessary for maintenance/replacement). Results and recommendations are communicated on local and national level enabling coordination between actors for efficient financing of electrification to reply to demand;

(co)investing in PV installations clinics applying standard contracts established with FENASCOM. Few clinics were installed with EnDev supporting (partial) CAPEX (clinics contributing in OPEX). In all cases, installation takes place by trained technicians (supervised by EnDev) with contracts for maintenance closed by clinics;

Create awareness of quality PV in rural areas together with companies during village and network meetings; facilitating rural market entry for companies with know-how and confidence of clients, presenting the full scheme of Pico PV available for clients to choose. Thereby helping to create demand and select sales points in collaboration with private partners. The approach is evaluated regularly and interventions now take place with local village-meetings organised by the village itself. Some regions easily develop after initial visits (like Kayes where many family-members live in Europe) while others like Baroueli require first adopters and more time for reflexion;

### **Reducing e-waste through repair & recycling**

Repair & recycling has been initiated with an e-waste competition and is now continued as common practice. A recycling chain for regular batteries exists while the project seeks to add repair re-use and recycling for all (Pico) PV elements;

Awareness about the subject is raised (with public and private parties) and training on repair takes place (fridges, solar lamps, Pico PV etc) with operators/local technicians already engaged in PV and/or repair (of telephones/flashlights);

Exchange with companies and national government (DNE and AER) to include repair & recycling in company policies and national strategies;

### **Access to electricity in a vulnerable setting**

NIS will execute the project in the North of the country where the foundation is active in the field since 2014. Based on experiences obtained in Mali and in a similar context in other countries like Somalia, access to electricity will be delivered in villages that are reasonably big, well accessible, with multiple ethnic groups and the potential to develop productive activities. Since the beginning of 2020, three out of twelve villages have been selected.

At present streetlights have been placed at marketplaces (structured contribution maintenance by market committees) and further electrification is being prepared.

Extendable nano(flex)-grids and energy-kiosks are developed based on experiences in the south of the country to increase access to electricity.

Exchange on inclusion of electrification in humanitarian approaches and lobby for additional third-party funding enabling the realisation of a mini grids (villages with 5000-7000p) takes place with TA of EnDev;

### **Reasons for approach**

The approach is chosen based on actual experiences obtained in the field, exchanges with stakeholders and the platform of technical/financial partners in which EnDev participates (as only partner exclusively working in rural areas). Together, this delivers a clear vision on actual shortcomings in the sector and potential ways to overcome this. Moreover, the network allows EnDev to communicate directly about the need to truly integrate **rural** electrification in general electrification planning. An opportunity taken and reinforced giving an example in Baroueli (where many lessons have already been learned) and advancing when possible with the cartography on national level (WB).

Electrification of clinics was part of the program in Baroueli and the need for assistance turned out to be rather urgent as the collaboration with FENASCOM came in sight. Having realised installations at clinics that work for over ten years now, positive testimonies make that EnDev is well positioned to help and started to execute an inventory of demand in the Segou region with other regions to follow.

Taking true sustainability as core of all interventions, the step towards repair and recycling has been made and the need of it is already communicated in the network of EnDev at place, initiating the movement.

### **Effectiveness and Cost-efficiency**

EnDev-Mali seeks to apply an efficient approach, stimulating others to invest in its intervention area and create spin-offs, improving lifetime of installations, making sustainable what is not (example: clinics), accentuating the need to spend funds efficiently (integral approach, including rural electrification in electricity-planning) and facilitating efficient spending of funds in Baroueli and beyond. The explicit collaboration with others does cause that direct results in numbers may appear limited. TA for 1100 clinics is e.g. important yet only part of that can realistically be attributed to EnDev.

The collaboration between SNV and GIZ for EnDev-Mali is also meant to improve effectiveness, increasing impacts for clean cooking and pico PV using networks of both organisations whenever possible. Pay&Go has specific potential to facilitate higher tiers in electrification and cooking.

## **Cooking**

### **Approach**

The market-based sector development approach is chosen, based on two components.

- **Expanding the pioneering market for improved household cook stoves** with key interventions aimed to improve the enabling environment (labelling) with a focus on demand creation and professionalizing supply in secondary towns. The label will be the pillar of the market development strategy, as well for demand creation as for supply development (financial incentives for suppliers). In parallel, the development of a cleaner cooking sector will be addressed by continuing and scaling pilot activities related to bio-ethanol and biomass-based briquettes.
- **Developing market intelligence on productive use and alternative fuels** by researching biomass alternatives & innovative technologies with focus on high wood consuming productive use (cotton-oil producers, bakeries, milk pasteurization, etc).

## Activities

### Supply

- RBF facility, managed by SNV, to support companies to develop sustainable distribution networks outside Bamako (Ségou, Koutiala, Sikasso, Kita, etc)
- Business Development Support to ICS companies and cooperatives (coaching and training on business management, marketing, quality assurance, after sales service, networking, etc.)
- Exploring with the companies and cooperatives on how to create better opportunities for women to integrate in the supply chain, in the marketing and sales for instance.
- Further explore the opportunity for women in the pottery sector to integrate the ICS supply chain of ceramic stoves.
- Coaching and support to companies developing business in alternative fuels, in particular bio-ethanol and briquettes (market intelligence, partnership development, marketing)

### Demand

- BCC in rural settings on simple low/no cost technology
- Communication campaigns related to the label
- Targeted communication campaigns on alternative fuels (in particular PU for biomass based briquettes)

### Enabling Environment

- Continue meetings with inclusive platform
- Capacity building of M-ACC, including operational support and support on fund mobilization / development of a financial sustainability strategy
- Develop the testing environment. Testing and control are key and testing capacity is a challenge in Mali. Where possible capacity building to AER will be delivered, but it's not excluded to collaborate with more developed testing centres in the region such as in Dakar and/or Accra. (Building on CCA/ISO/EPA trainings).

## Reason for the approach

In the long history of interventions in the cooking sector in Mali, thus far a truly inclusive approach has been lacking, which had negative effects on the sustainability. During the first year of the EnDev clean cooking programme it has been noticed that a couple of companies and cooperatives are very ambitious and motivated, while others seem to be satisfied with



the status quo. EnDev will focus on collaborating with the first group, while the latter may come on board when showing ambition and motivation. Basically, all support activities are more or less result based.

Apart from support to the ambitious and motivated actors in the sector, EnDev will rather seek to identify new high potential actors/products in the market.

The rural component might at first sight seem low impact for EnDev standards, but with very limited financial resources (piggy backing on Pico PV intervention) we believe to be able to create high social and economic impact for thousands of rural households. Besides the direct benefits for these households (also responding to the LNOB principle), indirectly it could create more conscience on the opportunities how improved cooking solutions can improve their lives.

The quality label proved to be challenging to develop, though is an important tool to regulate the market. All kinds of (artisanal) stoves can be found on the market, but it's impossible to guide customers to good quality.

The M-ACC is a good opportunity to build a strong and inclusive sector for the long term. They are young but accepted by major actors.

### Effectiveness and Cost-efficiency

EnDev-Mali seeks to apply an efficient approach, stimulating sector actors to invest and take the lead for sustainable sector development. The RBF facility is based on the principle that the company has to first undertake an investment before getting financial compensation. During the first years of the EnDev intervention relatively much efforts are made in the improvement of the enabling environment, though still having ambitious sales targets.

The collaboration between SNV and GIZ for EnDev-Mali is also meant to improve effectiveness, increasing impacts for clean cooking and pico PV using networks of both organisations whenever possible. Pay&Go has specific potential to facilitate higher tiers in electrification and cooking.

## 1.12.6 Results

Project results	Target reached 2020	Target 2024	[Other target dimensions/indicators]
People: Access to Electricity	35.637	124.142	Strategy paper integral electrification, bankable businessplan mini/flexgrids, trained rural network of (60) operators and (180) basic technicians (actually: 32 operators (1 female) and 50 technicians (1 female))
People: Access to Cooking	0	185.535	Strategic Plan M-ACC developed and operational
SI: Access to Electricity	330	503	TA +800 clinics and +200 maternities, (TA 300 clinics in execution, total 1100). 50 SI in vulnerable setting
SI: Access to Cooking		/	
PU: Access to Electricity	146	586	At least 150 new SME's incl 50 female and 40 in vulnerable setting

PU: Access to Cooking	0	140	Alternative fuels and focus reduction high wood consuming sector, 50% female enterprises 10 repair facilities PV and recycling initiated (20 technicians trained already)
Climate (tCO2/y reduced)	836	2.284	

## Electricity

The identified components have their unique results yet contribute together in the realisation of outcomes and impacts. It is to be noted that the current project proposition is benefiting from the impact that working installations at clinics, realised 10 to 12 years ago, now have – being remarkable in a context where nearly half of the installations do not function at all or only partly . At 250 clinics in the actual inventory, average costs for repair are nearly similar to costs of new installations.

Moreover, the project had a lasting impact on the mini grid sector with its high service levels and initiated prepaid metering. This having said, true cost-recovery is still worry-some at many networks given political pressure to reduce tariffs and (other) donors still implicated at this level.

### Demand oriented integral electrification

- Through direct collaboration with communes, local understanding of the need and solutions for electrifications is created and **good governance stimulated**;
- Small scale electrification-funds (put in place by commune+EnDev) are available in the communes and - though small in size - they do contribute to a feeling of **ownership**;
- In the long term the approach allows **local authorities** to take responsibility in the electrification of rural Mali within the national framework and **stimulate investments by themselves**.
- Technical assistance to check, correct and/or install PV is delivered for **>1100 clinics** (started in 2020) that will consequently be enabled to deliver more/better health services. As clinics are impacted by badly installed PV without them really understanding the causes, increasing sustainability is expected to also have general impact on **awareness of quality of installations**, creating demand;
- 180 technicians will be trained at basic level (nearly half way in execution) while at least **60 technicians** are trained at a level where they are capable to **earn their income** in the sector. At least three technicians are trained per health district to reach coverage with the best one or two selected to serve clinics (contracts apply), execute installations in the field and collaborate with the private sector;
- Parts of the practical training are meant to be linked to (rather simple) installations at **rural maternities** (linked to clinics but at distance), a way to double-check the quality of installations. Women manage the maternities and will be involved as such;
- **Important Pico PV contracts** are in negotiation with farmers' unions in order to include the lamps in agricultural credit, which might boost the market. Willingness exists, discussions and negotiations between partners put in contact through EnDev are launched and also depend development sin the agricultural sector (mostly harvest of cotton).

## Reducing e-waste, repair & recycling

- **5 points of repair** have been realised in solar kiosks (technicians check defects, perform easy decentralised repair paid by clients or within guarantee) and **another 5** will be added while recycling activities are initiated (an e-waste PV competition is part of the current phase). This can reduce waste, prolong the lifetime of systems and contribute to overall sustainability in the sector;
- **Inclusion of e-waste reduction in PV strategy** is discussed and initiated;

### Access to electricity in vulnerable setting

- Social impact is expected to be important as the population is feeling left behind of those in the south of the country. Investing in electricity directly contributes to their **feeling of well-being** and can help develop additional **income generating activities**.

### Gender

As the sector is dominated by men, specific actions aim to better include women (please see safeguards & gender). At the moment the project collaborates with 30 women groups (pico PV, collect/repair), realised 2 full time jobs at energy kiosks and 40 part-time ones and trained two female technicians capable to realise installations independently. In upcoming phase, another **10 women groups** will be added and of PU directly facilitated by the project in an individual approach (implying SHS – not (mini)grid access) aims to facilitate another **40 female entrepreneurs**. For Pico PV activities, monitoring of Pu and gender still needs to improve and exchange with companies takes place to that extend.

In the intervention area, women groups will be trained in simple actions of repair while Pico PV village meetings are used to teach women how to reduce the use of fire-wood; a first step towards clean cooking.

### Cooking

#### Facilitating market development clean cookstoves

Up to December 2020 no results have been accounted. This is related to the complexity of the state of the market as explained in section 3 above and the delays with regard to the label and with testing. Even though artisanal producers and their clients are aware of the concept of ICS, the large majority of produced metal stoves aren't fabricated according to the technical guidelines (dimensions, quality of material used, etc). These stoves are considered as ICS by the population, but in reality they are not. A lot of producers also innovate on existing ICS models without testing them. Basically all stove producers admit that they are forced to make concessions on quality (reduce dimensions, use lower quality metal, etc) in order to be competitive. In stead of tier 2 (the minimum standard we are aiming for) they are tier 1 stoves. Therefore we consider the baseline for artisanal metal ICS (referred to as the most common model "Nafacaman" in the OCS) zero (0).

Next to artisanal fully metal stoves, in Bamako metal stoves with ceramic liners are on the market, that however are hardly found outside the capital. This is because the Bamako market is not saturated yet and the carbon PoA is only valid for stoves used in Bamako. The stoves under the Gold Standard carbon projects (two stoves from two different producers)

are disseminated with some quality guarantee as regularly DOE verifications take place. The baseline for these stoves is about 40,000 sales (based on production data) per year in total, all of them sold in Bamako where demand is far from saturated.

The project will facilitate the sales of 175,000 additional (to the baseline situation) improved and clean stoves over the period 2021-2024, and deliver access to improved cooking for 185,535 people, at least 50% outside Bamako.

Following studies and pilots on productive use opportunities in 2020-2021, 350 PU stoves will be installed over the period 2022-2024, 50% concerns PU with women in the lead.

In addition to these measurable results:

- the project will further develop the sector by addressing important market failures through the introduction and operationalisation of a quality label and communication campaigns around it.
- The Mali Alliance for Clean Cookstoves will be reinforced. A strategic plan will be elaborated.
- The project will support the transition to alternative cooking fuels (in particular briquettes and bio-ethanol), though at this stage we don't have the necessary market intelligence to put a tangible quantified target on this.

## 1.12.7 Sustainability

### Electricity

Increasing the sustainability of PV installations is one of the main intervention areas in the current project proposition and technical assistance is given to this extent. This starts with choosing the optimal technology for electrification, assuring cost-effective operation (mini-grids, results are communicated to assure it can be applied once hybridising networks as well) and quality installations as well as maintenance and repair of other PV appliances. More details are to be found below:

#### Financial sustainability

- Most investments in the rural sector are donor-funded and project based. Not the most sustainable framework. Through EnDev, sustainable operation and the necessity of cost-effective pricing is explained at all levels, contributing to a self-sustaining sector;
- Clinics are able to pay for maintenance and replacement and contracts with private operators are applied. This will avoid continuous re-investments in installations blacked out and only requires initial follow-up of technicians by the project. Modular installations are applied to assure that replacement does not come all at once (success-factor).;
- Maintenance of smaller installations is only financially possible with local technicians (given important distances and costs of transport). A network is put in place to this extend while cost effective business plans are made available for the sector;
- Additional jobs and income are generated;

- Communes (learn to) manage small scale revolving funds transparently (at about 5% of the communal annual budget at present) to continue electrification. Local committees are actively involved to this extent and receive small incentives for payments effectuated. Ownership of few privately operated mini grids takes place with sharing of benefits of operation in the communal energy fund (pilot to be evaluated);

### **Institutional sustainability**

- Investments in electricity in the intervention area of Baroueli take place in direct collaboration with local communes to increase their level of understanding, independence, transparency and a vision on further electrification activities;
- Clinics: multiple clinics have experienced the effect of bad installations; the best witnesses of sustainability are found at this level. The implication of the federation of clinics organised at national/regional and local level, assures good embedding and contracts with private operators for follow-up assure a solid exit-strategy for EnDev;

### **Ecological sustainability**

- Use of renewables (EnDev promotes solar/diesel hybrid mini grids with optimal energy mix allowing maximum PV with sharp tariffs) to reduce climate effects;
- Including repair and initiating recycling to improve lifetime of use and reduce e-waste, in collaboration with private sector to assure continuation beyond project duration;
- Including pilots to enable sales of refurbished equipment with good quality and reduce impact transport / reduce e-waste;

### **Technical sustainability**

- Training technicians able to work independently to realise quality installations and follow-up;
- Transfer of knowledge takes place with general training and specific on cooling, making PV supports (locally instead of in the capital), including repair and recycling etcns for regular (solar) fridges already available and implicated;
- Initiating at distance monitoring for flex- and mini grids by/with private sector, necessary to continue electrification in an efficient way.

### **Social sustainability**

- Increased services at SI (Baroueli: municipalities, maternities and clinics on national level) with maintenance contracts. Implication of the federation of clinics (national, regional, local) will further embed sustainable use for good health services;
- Replying to demand to reach stabilisation – local technicians are available to continue follow-up;
- Communication on quality and sustainability of installations intensified, products are adapted to needs and come available in rural market, continued by private sector;
- Social tensions can take place at mini grids once service gets lower than demand – cost effective tariffs and a vision of extension at starters are applied to overcome this / allow extension.

### **Exist & handover strategy**

The integral approach to electrification is executed in collaboration with public and private partners. Facilitated installations are transferred to their owners while private partners

continue the service well after the project has stopped. It has to be noted that the exit-strategy at first mini grid site was not that well designed, mostly as implication of the project in technical set-up has been too high. This is changed in the new pilot for the mini grid for two villages in the commune of SANADO. In this tender the private operator is involved in the design, installation and signed a 15-year contract for operation with the commune at starters.

The intervention of sustainable electrification is explicitly included in the exit strategy. Without sustainable systems, calls for help will continue and the project will have difficulty stepping out. Yet all systems are owned by beneficiaries and assistance is followed-up upon by companies and/or trained technicians that are contracted and paid by beneficiaries. The project thereafter only assists in case of problems while irregularly checking the installations' functioning in the field to test its own approach.

For e-waste, the private sector, impact-hubs/youngsters and the nation energy directory as well as the agency for renewable energy are implied to assure continuation.

The execution of the project in vulnerable setting seeks sustainability with inclusive approaches, replying to electrification-demand of the population and training of local technicians. The context is volatile, and the project prepares extensively and executes quickly to start follow-up; learning/adapting is an important part of the project approach to allow a smooth exit after the project phase.

## Cooking

### Financial sustainability

- The project is fully market based. The main challenge in terms of financial sustainability is the funding for the application of the label. The operationalisation and acceptance of the label is key for a sustainable sector. This has been addressed from the beginning of the project and M-ACC will be supported by EnDev to develop a strategy to get funding from within the sector.

### Institutional sustainability

- As concluded in the RVO publication on the clean cooking sector support<sup>55</sup> “the clean cooking sector is in need of a convening, coordinating and binding force, providing a strong and aligned voice to the sector, and a common base for knowledge and expertise. Such a binding force – e.g. a national alliance – can form a ‘coalition for change’ and facilitate transition thinking in the cooking sector”. A lot of effort will be put by EnDev on institutional capacity building of M-ACC, but also to a lesser extend and more indirectly to the different government agencies (AMADER, AER, ANADEB). All relevant sector actors are and will be involved in discussions and activities related to sector development. The BDS to the companies is fully focused on the long term sustainability of the companies (support with business plans, establishment of efficient distribution chains throughout the country, client relationship building through good services, etc.)

### Ecological sustainability

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<sup>55</sup> <https://english.rvo.nl/sites/default/files/2019/10/End%20of%20program%20report%20Clean%20Cooking.pdf>



- Currently all stoves are locally made from recycled metal and/or clay. Wood regeneration rate in Mali is far below 100%. Even though it is too ambitious to target a healthy forestry sector (if not only because deforestation goes beyond energy use alone), through ICS, wood consumption for energy will decrease compared to business as usual. Initial initiatives by the Mali Government and a number of companies for a transition to bio-ethanol and biomass-briquettes will be supported, taking into account to avoid potential ecological harm (land use for crop cultivation just for the bio-ethanol, deforestation for briquette production, etc.)

### **Social sustainability**

- Access to ICS through a market approach will do no social harm. For the transition to bio-ethanol, potential land-use conflicts (food vs fuel) will be addressed in strategy and policy.

### **Technological sustainability**

- Technical know-how is available. The requirements for using the label (and for being eligible for RBF) include after sales service

### **Exit strategy**

Mali has a long history of interventions in the cooking sector, but a market-based sector development approach with result-based support for the actors is new in the country. During the five years of the project (started end 2019), EnDev intends to show the potential of such an approach to government and private actors. The aim is to create at least a solid enabling environment with an emerging private sector.

What can't be addressed (except a small RBF component in order to increase the distribution network) by EnDev in the current proposal is access to finance for private sector and end-users to further invest. During the project EnDev will explore opportunities to tackle the finance barrier with financial institutions and eventual other interested bilateral and multilateral actors. Currently AFD is preparing the strategy for a clean cooking intervention and they already have contacted EnDev to exchange on complementarity. The content of the AFD strategy is however not yet clear.

## **1.12.8 Gender Strategy and Safeguards**

The fragile context in Mali makes that multiple studies for safeguards and gender have been executed at GIZ and its partner organisations. A thorough study is being concluded at GIZ at present (January 2021). A gender study has already been performed for EnDev-Mali, in exchange with the team and few partners. A national gender strategy for the energy-domain is being elaborated based on CDEAO leads, a process in which EnDev participates.

Safeguards and principles of 'leave no one behind' and 'do no harm' apply in multiple areas and require an approach that are not only gender sensitive but also includes multiple ethnic groups, not making a difference and investing in TA and hardware based on transparent criteria and in line with demand. Training on these principles took place for the project staff and principles are overall applied in the project and specifically in the North of the country where interventions take place in vulnerable setting.



Though the project collaborates with women groups since 2014 in pico PV distribution, more should be done. A gender focal point is active at EnDev GIZ and at disposition of the project at SNV. A few gender specific activities are already implemented since 2018:

- Pico PV campaigns are held at village meetings (instead of chief villages/commune), reaching more women and making the program more effective as women are often those requesting light for household activities and their presence is guaranteed >60-70% (normally max 30%). When the network for repair is functional this will be launched in a similar way, as part of the pico PV campaign reaching women and implicating them in service after sales;
- Productive use : gender-equal yet with emphasis to include women. Evident needs of women besides general light at home, are solar pumping for agricultural needs (women-groups with relatively low level of professional organisation), ice-making for fish and fridges in general for drinks. Moreover, problems were expressed in planning of the market (requiring both dryers and cooling) and demand for milling/choppers exists. In Baroueli, Plan International executes a program focused on productive use exclusively for women, in coordination with EnDev. Seeking gender equality in this context, EnDev decided to offer PU in line with demand expressed by women, discuss gender with beneficiaries yet not to select based on gender. At present most inscriptions for lease purchase (of systems requested by women) facilitated by EnDev, are effectuated by men while most systems are (at least partially) exploited by their wives. Evaluation of exact female implication and satisfaction is yet to follow.


In the next phase the gender activities consist of following :

- Participation in the elaboration of the final national gender strategy for the sector and elaboration of resulting action plans on project level;
- Participation in new trainings and activities concerning gender, offered by GIZ (as well as SNV) and exchange with national partners regarding the overall strategy of the sector;
- Preference for participation of female technicians (with babysit if necessary) during practical trainings (two of three female technicians selected also participated at present);
- Continue to reach out to women during village meetings to get information about their needs and demands besides general demand of lighting and cookstoves (pico PV campaign);
- Conduct workshops with elected women to discuss needs they identified and implicate them in the promotion of women's development through solar energy and improved cooking access;
- Reply to actual needs already identified: lease purchase of solar fridges, solar dryer, pumps and choppers for financial independence specifically aimed at women (while man request equipment for haircuts, tailoring, welding, repair of electrical equipment);
- Train women groups in leadership, management and marketing in collaboration with Plan International (necessary to overcome relatively low level of professional organisation seen in the field, most groups are NGO funded, do not develop themselves beyond the initial activity and few are in practice managed by man);
- Continue sales of Pico PV and start sales of ICS in collaboration with women (groups);

- Promote the integration of women in the distribution chain (marketing and sales, but also production of ceramic liners for instance)
- Implicate women in service after sales and train few groups in simple actions of repair;
- Put energy at everyone's disposal so that man and woman find interest and means of economic development (ref balancing benefits approach of SNV).
- Include gender disaggregated data collection and evaluation of gender specific results together with (public and private) partners.

# 1.13 Mozambique

## 1.13.1 Summary and key data

<b>Promoted technologies</b>			
<b>Summary of proposed interventions(s)</b>	<p>EnDev Mozambique follows a holistic, multi-tier approach, covering different <b>electrification</b> technologies. Off-grid PV systems supported include picoPV technologies, like small lanterns, and plug&amp;play Solar Home Systems (SHS) which are commercialised under credit-based, PAYGO schemes. To enable higher tier electricity access in areas far from the grid, EnDev will further focus on the development of nano-grids with scalable technologies, which allow the island grids to grow dynamically with demand over time. Notably, it is expected that this type of solutions will encourage the uptake and will be able to flexibly adapt to PUE activities, thereby contributing to the economic transformation of the targeted communities. For tier 5 electricity access, EnDev will continue to support the national utility Electricidade de Mocambique (EDM) with grid densification.</p> <p>For <b>clean cooking</b>, EnDev also follows a holistic, multi-tier approach addressing markets for cleaner and affordable clean cooking technologies through the introduction and promotion of higher tier industrially produced stoves and good quality, standardised, locally produced stoves (low-end and high-end products). In parallel, EnDev supports awareness raising activities to ensure that consumers are aware of and are able to identify and purchase quality products. By making available consumer finance schemes and innovative sale promotions, for example bundling of stoves with solar systems, the programme will increase the purchasing capacity of the target group, leading to more consumers buying clean cooking technologies.</p> <p>EnDev also supports <b>social institutions</b> like schools and health centres with access to electricity and clean cooking to improve their services, through key strategic local partners. In supporting <b>Internally Displaced Persons (IDPs)</b>, EnDev opted for the commercialisation of subsidised technologies.</p>		
	<b>Quantitative targets [# of]</b>		<b>Further relevant impacts/outcomes</b>
<b>Energy for lighting / electrical appliances in households</b>	60,000	People	
<b>Cooking / thermal energy for households</b>	14,000	People	
<b>Electricity and/or cooking / thermal energy for social infrastructure</b>	30	SI	
<b>Energy for productive use / income generation</b>	10	(M)SMEs	
<b>Project period</b>	01.01.2021 – 31.12.2024	<b>Indicative Budget</b>	5,000,000 EUR <sup>56</sup>

<sup>56</sup> The overall budget of EnDev Mozambique for the next phase is 21,933,000 EUR, including co-financing from the EU, NORAD and BMZ amounting to 16,933,000 EUR. The results presented in this proposal include the results of the core budget and the co-financing, while the presented activities refer exclusively to the EnDev core budget.

## 1.13.2 Theory of change (ToC) and state of market

### Electricity

Economic growth and human development in Mozambique are constrained by a lack of access to energy. For electricity access, the government of Mozambique has set an ambitious target of universal access by 2030, but the national electricity utility company will be able to reach only about 50% of the population by then.

Hence, electricity access areas that cannot be reached with the national electricity grid will strongly depend on a strong development of markets for off-grid technologies. While a few years back, people barely had any knowledge of off-grid systems, the awareness among the population about them being a viable way of obtaining energy access is rising and a few companies have entered the market.

However, these markets remain highly underdeveloped and donor dependent. High poverty rates and low-density populations pose serious challenges in terms of finding adequate business models that can tap the demand and be profitable, while remaining affordable for the population.

EnDev Mozambique supports two types of off-grid electricity markets: the SHS and picoPV market and the nano-grid market. EnDev Mozambique aims at a bottom-up approach to higher-tier island grid electrification, based on smart, scalable and viable technologies that can be deployed at nano-size but have the ability to grow in time and with demand.

## Theory of Change - EnDev Mozambique Off-grid

<b>Impacts</b>	<b>Energising Lives - Social development</b> Local communities in Mozambique are less vulnerable, have an improved income and health situation, better learning environment, as well as an improved gender equality.	<b>Energising Opportunities - Economic development</b> Rural economic activities are strengthened, SME productivity, job creation and resource mobilization is increased due to access to off-grid energy services.	<b>Energising Climate - Combating climate change</b> Beneficiaries' resilience to climate change is strengthened, forest degradations and GHG emissions reduced.
<b>Assumptions</b>	Sustained demand / use of off-grid products and services Increased and sustained supply of high quality & affordable off-grid products in urban and rural areas Off-grid businesses make use of financing schemes to grow. More businesses enter the market. Improved off-grid business environment		
<b>Outcome</b>	Increased number of households, businesses social infrastructure have access to off-grid products Private sector supplies timely, cleaner and affordable off-grid products and services in urban and rural areas. Off-grid businesses have the potential to grow and thrive. Key regulatory and economic challenges are mitigated or overcome.		
<b>Assumptions</b>	More people, schools and business, especially in rural areas, purchase off-grid products Strengthened distribution channels and market mechanisms lead to more supply Businesses have enhanced capacity, enabling access to financing Nano-grid market becomes more attractive to financiers GoM adequately supports off-grid market development. Businesses exchange knowledge and make use of available market insights.		
<b>Outputs and results</b>	Demand of off-grid products is increased. Knowledge about off-grid products and services is increased. Consumer financing schemes are available Effective and efficient value chains in place. Qualified workforce is available/trained. Proven business models for nano-grid electrification are in place. Businesses have public access to market information. Businesses receive tailored financial support, as well as management & BDS. GoM adequately supports off-grid energy market development and regulations regarding quality standards of off-grid are in place. Businesses have regular opportunities to meet to improve B2B partnerships.		
<b>Key interventions</b>	<b>Access to finance</b> <ul style="list-style-type: none"> <li>Results-based financing</li> <li>Financial assistance</li> </ul> <b>Business Development Services</b> <ul style="list-style-type: none"> <li>Technical/business capacity building</li> <li>Equipment and in-kind support</li> </ul> <b>Evidence, learning transfer and innovation</b> <ul style="list-style-type: none"> <li>Data analysis and monitoring</li> <li>Knowledge management and innovation support</li> </ul>		<b>Policy advice</b> <ul style="list-style-type: none"> <li>Strategic and policy advice</li> <li>Capacity building for conducive framework conditions</li> </ul> <b>Partnerships and alliances</b> <ul style="list-style-type: none"> <li>Multi-stakeholder collaboration</li> <li>International advocacy</li> </ul>
<b>Barriers</b>	<b>Demand side barriers</b> Households, social infrastructure and businesses have low purchasing power/capacity to invest. Limited access to finance. Limited awareness about off-grid technologies	<b>Supply side barriers</b> Weak value chains. Limited training institutions for off-grid experts. Companies cannot access scarce, affordable capital because companies are not eligible for banking financing. Business capacity and managing skills are limited	<b>Enabling environment barriers</b> Lack of regulations to guide the market No mechanisms to incentivise off-grid business
<b>Assumptions</b>	Demand is low as products are not affordable for the majority of the population. Supply does not cover the demand and end mile retail is not viable without third party financing, especially in humanitarian settings. No profitable business models for nano-grid electrification in place Lack of market information increases risk profile and reduced ability to access finance Access to finance remains limited for businesses. Energy targets, policy, institutional framework and roles are unclear and/or weak, leading to uncertainty in doing business		
<b>Root cause</b>	Almost 50% of the population live below the poverty line. Retail in rural areas is difficult due to low population density Limited financial and knowledge capacity The banking system is underdeveloped and RE projects are seen as "high risk" Low priority to de-regulate the electricity market for the private sector and to enforce quality measures. Low public attention on RE market Lack of public available market information		
<b>Core problem</b>	Economic growth and human development in Mozambique is constrained by a lack of access to energy.		

For the electricity sector, the key intervention areas are: Access to finance, business development services for the companies, evidence, learning transfer and innovation, policy advice and the partnerships.

With regards to access to finance, the main barrier faced by local distributors of SHS/picoPV technologies or nano-grid project developers is the same: they cannot access affordable bank financing. The banking system in Mozambique is underdeveloped and there RE projects are perceived as being high risk. **Finance interventions** thus aim at increasing the availability of reliable market information, improving the management and business skills of the private players, providing seed financing to pilot new business schemes, and overall improving their readiness to access financing. Direct collaboration with banks is not foreseen at this point but could be an interesting avenue to explore in a future scale-up of the project. The key demand activation interventions in both areas are thus geared towards improving the awareness about available alternatives to grid connected power supply, as well as supporting innovative consumer financing scheme to increase the target groups' ability to pay. This is further reinforced with productive use approaches, wherever possible.

The supply side of both markets experiences different barriers. For SHS/picoPV the main barriers are linked to weak distribution and value chains and the need of a well-trained workforce that can carry out sales and provide maintenance service in off-grid areas. Here the **business development service (BDS) interventions** focus on training in management or technical skills, business match-making, peer to peer exchanges and other B2B measures. For nano-grids the challenges are more linked to lack of local know-how on how to develop, build and operate nano-grid projects, the complexity of building a good business model that works, and more mundane issues, such as the lack of technology components in the country. The BDS interventions therefore include TA for business model development, one-to-one advisory among others.

Lack of market information and businesses' and organisations' capacity to managing skills are limited, the **evidence, learning and innovations** focus on learning transfer, knowledge exchange among businesses, research and information sharing and capacity building of the administrator FDC of the FASER Fund (Fundo de Acesso sustentável as energias renováveis em Moçambique, Fund for Sustainable Access to Renewable Energies and Efficient Technologies).

Overall, the enabling environment for rural electrification in Mozambique remains weak, with unclear policy, objectives, roles, and overall institutional framework. Therefore, strategic **policy advice** will address the most important enabling environment barriers for off-grid technologies. In view of the different business models of SHS/picoPV (mainly product sales) and nano-grids (mainly energy sales), policies and standards that need to be in place differ. While for SHS/picoPV providers quality standards are key and solutions for e-waste are important to ensure the sustainability of the market, nano-grid developers depend on the government deregulating the market for private players and putting in place incentives to set-up business in areas where the grid will not be available in the medium to long term. **Partnerships** interventions will be focused on these specific needs and will, in both areas, support an enhanced B2B cooperation to leverage synergies and cost-saving potentials through strategic partnerships.

## Cooking

Economic growth and human development in Mozambique are constrained by a lack of access to modern energy services. Over 4.5 million households do not have access to modern cooking solutions and are exposed to related health and environmental risks. In urban areas the benefits of ICS are well known as the economic saving potential resulting from lower spending on fuel are significant. But in rural areas, where fuel is collected at no cost, awareness and perception is still very low.

In the past 2 years and with EnDev support, the total number of cooking technology businesses in Mozambique increased: from 4 to almost 20. However, total sales are still low, with about 20,000 ICS purchased annually on the market. While clay stove costs remained rather constant, charcoal stove costs have decreased due to scaling up of production and procurement of material in bulk. However, with roughly 200,000 people owning an ICS today, the untapped market is still huge. Demand side barriers are lack of purchasing power and limited knowledge about health and environmental benefits.

Therefore, access to clean cooking for a larger share of the population will depend on the continuous support to the development of the market of improved cookstoves and active participation of the private sector to supply clean cooking solutions to households and businesses.



## Theory of Change - EnDev Mozambique Clean Cooking

<b>Impacts</b>	<b>Energising Lives - Social development</b> Local communities in Mozambique are less vulnerable, have an improved income and health situation, as well as an improved gender equality.	<b>Energising Opportunities - Economic development</b> Rural economic activities are strengthened, SME productivity, job creation and resource mobilization is increased due to access to improved cooking energy.	<b>Energising Climate - Combating climate change</b> Beneficiaries' resilience to climate change is strengthened, forest degradations and GHG emissions reduced.
<b>Assumptions</b>	Sustained demand / use of ICS Increased and sustained supply of high quality & affordable ICS in urban and rural areas Increased availability of high quality & reliable ICS including for alternative fuels ICS businesses make use of financing schemes to grow. Improved business environment		
<b>Outcome</b>	Increased number of households, businesses and social institutions, including in humanitarian settings, have access to ICS. Private sector supplies timely, cleaner and affordable ICS in urban & rural areas. A larger diversity of competitive and high-quality ICS products enter the market successfully. ICS businesses have the potential to grow and thrive. Key regulatory and economic challenges are mitigated or overcome.		
<b>Assumptions</b>	More people, schools and business, especially in rural areas, purchase ICS. Strengthened distribution channels and market mechanisms lead to more supply. Improved/new ICS and strong evidence on alternatives improve market potential. Businesses that have enhanced capacity and access to information have better access to financing GoM adequately supports ICS market development.		
<b>Outputs and results</b>	End consumer finance schemes are available. Effective and efficient value chains are in place. Qualified workforce is available. (Semi)industrial production is in place. Biomass testing facility is operating. Alternative fuel/ICS technologies are available. Businesses have received tailored financial and management & business support. National standards for ICS are in place. B2B partnerships are in place and improved.		
<b>Key interventions</b>	<b>Access to finance</b> <ul style="list-style-type: none"> <li>Results-based financing</li> <li>Financial assistance</li> </ul> <b>Business Development Services</b> <ul style="list-style-type: none"> <li>Technical/business capacity building</li> <li>Equipment and in-kind support</li> </ul> <b>Evidence, learning transfer and innovation</b> <ul style="list-style-type: none"> <li>Data analysis and monitoring</li> <li>Knowledge management and innovation support</li> </ul>		<b>Policy advice</b> <ul style="list-style-type: none"> <li>Strategic and policy advice</li> <li>Capacity building for conducive framework conditions</li> </ul> <b>Partnerships and alliances</b> <ul style="list-style-type: none"> <li>Multi-stakeholder collaboration</li> <li>International advocacy</li> </ul>
<b>Barriers</b>	<b>Demand side barriers</b> Households, social infrastructure and businesses have low purchasing power/capacity to invest and a limited access to finance Limited knowledge on health and environmental benefits.	<b>Supply side barriers</b> Technological diversity is limited, and production and value chains are weak. Business capacity and managing skills are limited and there is a lack of qualified workforce. Companies cannot access scarce, affordable capital/financing.	<b>Enabling environment barriers</b> Lack of statutes on standardization, quality and performance of ICS, as well as of national standards to guide the market. No mechanisms to incentivise ICS business
<b>Assumptions</b>	Demand is low as ICS are not affordable for the majority of the population and end mile retail is not viable without third party financing, especially in humanitarian settings. Supply does not cover the demand (ICS) in urban areas. Unstandardised and low-quality technologies dominate the ICS market Access to finance for ICS businesses remains limited. Energy targets, policy, institutional framework and roles are unclear and/or weak, leading to uncertainty in doing business.		
<b>Root cause</b>	Almost 50% of the population live below the poverty line. Retail in rural areas is difficult due to low population density. There is a lack of national quality standards and R&D investment capacity, paired with low consumer awareness and protections. The banking system is underdeveloped and ICS projects are seen as "high risk". Cooking energy is not a political priority.		
<b>Core problem</b>	Economic growth and human development in Mozambique is constrained by a lack of access to energy.		

For the cooking sector, the key intervention areas are: Access to finance, business development services for the companies, evidence, learning transfer and innovation, policy advice and the partnerships.

With regards to finance, ICS producers and suppliers are exposed to the same barriers and underlying root causes as SHS/picoPV and island grid businesses, while family-owned, very small ICS business may not even be eligible for financing. **Finance interventions** are thus the same. On the demand side, affordability and limited access to financing play a key role, as for electrification options. Furthermore, the majority of households cannot afford to purchase cooking fuel in bulk and instead buy in small rations on a daily basis. The ability to pay differs from male to female headed households, while the latter often have lower purchasing power. The key demand activation interventions are thus geared towards supporting innovative consumer financing schemes to increase the target groups' ability to pay, including bundled sales with SHS/picoPV technologies.

On the supply side, next to the difficulties of creating a profitable distribution structure in remote areas with dispersed settlements, weak local know-how and production and value chains further impedes ICS quality to increase and prices to drop. The **BDS intervention** thus focus on building a technically proficient workforce, establish (semi) industrial production sites in strategic locations and, overall, strengthening local value chains. Research and Development (R&D) for ICS is not consistently practised in Mozambique and unstandardised, low-quality technologies dominate the ICS market. ICS are usually produced in family-owned businesses, who lack the resources to invest in R&D. The **evidence, learning and innovation interventions** thus foresee capacity development of the established biomass testing centre BECT will be essential in elaborating the statutes on standardisation, quality and performance of ICS, develop and test new/existing ICS technologies and establish a solid, local knowledge base about ICS and its economic, health and environmental benefits.

With regards to the enabling environment, the policy and regulatory framework for ICS is virtually inexistent, with an urgent need to establish national quality standards to regulate a market that is characterised by underperforming technologies. This stems from the failure of the GoM to recognise cooking energy within their energy access agenda and giving the topic a very low priority, overall. **Policy advice** interventions will therefore strongly focus on continuing to advocate for ICS and carry forward the dialogue with government towards a plan to internalise cooking energy into energy access strategies. Furthermore, the development of national quality standards will be high on the agenda. **Partnerships** interventions will support an enhanced B2B cooperation to leverage synergies and cost-saving potentials through strategic partnerships.

### 1.13.3 Transformative character

#### Market development

Supporting and sustaining **market development** is at the core of the EnDev Mozambique interventions. EnDev's BDS approach for electrification and clean cooking is comprehensive and holistic, supporting companies in growing towards bankability, becoming investable and ultimately to grow their ventures, thrive in local markets and increase access to energy.

Support measures are designed by carefully identifying through a needs assessment those areas that require more attention to ensure a successful and efficient deployment of RE.

With improved access to finance and investments in R&D (for ICS), it is expected that more off-grid and ICS suppliers and technologies will enter the market in Mozambique. Further support in the standardisation of clean cooking technologies by EnDev will increase customer satisfaction, improve production processes, create confidence in the products and support growth of the clean cooking market consequently leading to a sustainable supply chain and profitable companies. Further, EnDev seeks to achieve substantial transformations by optimising logistics and cost structures of the supply chain. This will allow an inclusion of non-urban markets, which today have limited access to these technologies. Thus, both men and women in the rural market will have access to and can benefit from timesaving and health-benefitting appliances. By fostering strategic alliances between key private sector players, EnDev aims at increasing the affordability of products but also at raising profit margins to a level that the market can continue to grow with little or without donor support.

The availability of consumer financing schemes will increase the pace of adoption of such technologies in urban and rural areas. Consumers will be empowered to identify, purchase and sustainably use quality products. Ensuring a broad availability of end-consumer financing schemes will increase the widespread use of off-grid systems and ICS and concomitantly achieve financial inclusion of otherwise economically weak populations; especially of women who have a harder time accessing traditional financing options, like from banks.

The sustainability of market growth will further be ensured through a national framework providing incentives and upholding quality standards (including an exemption of VAT and duties for energy access products). Supporting the introduction of alternative technologies, for example e-cooking, will help to widen the diversity of products and actors in the clean cooking market.

### **Economic development**

Off-grid and ICS businesses will be able to grow and thrive, creating new employment opportunities for the Mozambican people, thus supporting their **economic development**. This is further enhanced by productive use of energy (PUE): Based on socio-economic and gender aspects, EnDev will support businesses with the acquisition of equipment to improve, extend or allow for new business activity, with a focus on promoting gender-balanced entrepreneurial activities. This will also include the commercialisation of PUE-ICS, as well as e-cooking appliances. During the COVID-19 pandemic, this entails the distribution of solar-powered sewing machines to produce face masks as a starting product, with the possibility to switch to other cloth manufacturing, like school uniforms, afterwards. This will create income and employment benefits for both men and women, resulting in poverty reduction and uplifting their living standards.

EnDev Mozambique plans to boost economic development in off-grid, urban and peri-urban areas, through access to higher levels of energy, stimulating opportunities for small and medium enterprises, thus creating diversity of services and products. Increased private sector investment – both in form of existing businesses expanding their activity but also in form of new players entering the market – will lead to a steadily increasing total annual turnover of

the off-grid electrification market. This will have a transformational effect, notably in economically depressed rural communities, as **new jobs** are created and the uptake of income generating activities is stimulated through a wider spread access to energy. The new jobs will especially increase the bargaining power of women, also empowering them in other aspects of their lives like access to education, reproductive health and childcare. Furthermore, involving women in the SHS and ICS value chains helps to reach last-mile consumers in a cost-efficient manner.

Even in areas where the **grid** has already arrived, many households and businesses have no access to the grid. EnDev will therefore continue to support grid densification activities aiming at connecting BoP clients to the national utility grid, thereby contributing to the **leave-no-one-behind** agenda.

### **Social development**

Access to energy contributes to the **social development** of the consumers by improving the learning and health conditions. Electricity access for social infrastructures like schools and health centres enables improved service quality and contributes to the goal of leaving no one behind.

Access to clean cooking in social infrastructure (**schools**) facilitates school feeding projects and reduces related spending of the Ministry of Education. Furthermore, clean cooking in social institutions will have an educative effect on pupils, who will get familiar with clean cooking technologies and might become drivers of change within their own households. The use of clean cooking technologies leads to improved health of the consumers, consequently reducing health-related spending of both households and the government. For many children living in low-income households the daily meal offered by the National School Feeding programme (NSFP) is the only warm meal they have during the day. The macro-economic impact of the COVID-19 crisis further deteriorates the economic situation of families, increasing the necessity and demand of the NSFP. It is in the light of this, that EnDev supports the NSFP in the effort to lower cooking energy consumption and costs to improve the sustainability of the project. This is expected to have a positive effect on girls' enrolment in schools, as parents are more prone to sending their girls to school when there is a feeding programme. Additionally, the electrification of rural schools aims at facilitating educational use of the institutions after sunset, e.g. for adults, and thereby contributing to the social development of the supported communities.

Adopting fuel-efficient stoves will reduce deforestation and degradation of forests in Mozambique thus reducing negative effects on the **climate**. Their adoption will also contribute to improving the quality of life of Mozambicans through as drudgery, time and money spent on fuel wood collection and **indoor air pollution** are reduced. Reducing the risk respiratory of diseases is especially important among women and girls, who are primarily responsible for cooking and therefore more exposed. Girls and women are also mainly responsible for collecting firewood and travel far off distances to collect firewood. This exposes them to snake bites as well as attack from other animals. They also face the risk of gender-based violence (GBV). GBV is more pronounced in humanitarian camps as women venture outside the camps to collect firewood. Efficient stoves reduce the frequency of firewood collection trips as well as the time spent on collecting firewood, thus help to reduce GBV.

As a patriarchal society, property is mostly owned by men and thus, women do not have the essential collateral to put up for starting new entrepreneurial activities. Thus, innovative end-consumer financing options, such as PAYG, are key for increasing affordability of women end users. With more women active in the SHS and ICS value chains last-mile consumers are reached in a cost-efficient manner. It also opens up new employment opportunities for women. This ultimately lifts women's status in society and increases their decision-making power within the households (addressing the long-term strategic needs of the women).

### **Poverty alleviation**

All measures with their impact on market, economic and social development are expected to contribute to poverty alleviation. Fuel savings will lead to money savings thereby increasing households' disposable income. Businesses using energy in a productive way (PUE) will benefit from increased/more efficient production and will become wealthier and more robust. In rural areas people can invest their time saved on fuel collection into more productive activities contributing to **poverty alleviation** of the target group. EnDev's gender sensitive interventions in the RBF Fund, like promoting gender-balanced business models, encouraging increased participation of women in trainings and encouraging women-led businesses, contributes towards gender equality and women empowerment, ultimately reducing the poverty disparity between men and women.

36% of Mozambican households are female headed (DHS Survey 2011). Generally, female-headed households are poorer and especially the rural female-headed households are likely to be marginalized and excluded. They also often cannot afford the grid connection fee or other off-grid clean energy products. Thus, the different gendered PUE activities can increase their income as well as uplift their living standards.

Especially in **humanitarian settings**, EnDev's support is expected to have a significant impact on poverty alleviation, as fuel and electricity access are extremely scarce in resettlement areas and economic activities are less frequent. The economic inclusion of consumers in humanitarian settlements (refugees and victims of natural catastrophes) provides an opportunity for them to transition from being aid-dependent towards economic self-sufficiency. Small businesses in resettlement areas with access to electricity can improve the overall quality of life and foster economic development in humanitarian settings. Furthermore, access to energy plays a significant role in improving the safety in settlement areas. For instance, the frequency of attacks (in particular on women) in settlements and their surroundings can be reduced by improving the overall lighting conditions of the sites and by reducing the need to collect firewood for cooking around the camps.

### **1.13.4 Collaboration**

EnDev's experience in promoting energy access in Mozambique **has paved the way** for more donors to enter and invest in the energy sector, replicating the positive lessons learnt. By contributing to a stronger coordination of donors in the energy sector and improving programme alignment, EnDev will continue to create and leverage synergies, to increase implementation effectivity of the programmes and to help mobilise further public and private funds to drive forward the energy agenda. Despite not leading to direct quantitative results for the EnDev programme, EnDev's impact on the sector through Leading-by-Example has the



potential to increase access to energy (Electricity & Cooking) following the EnDev principles and approaches. EnDev made the sector visible to the Governments and international cooperation and proved that there are multiple ways to assist the markets to develop. EnDev helped turning energy into one of the most important topics.

Overall, EnDev collaborates with the donor programmes of the energy sector and nexus sectors as follows:

**GBE and GET.invest:** both programmes are implemented by GIZ by a joint team of experts, that plan and implement all programmes' activities and work together in one office. Grüne Bürgerenergie – Green Peoples Energy Programme (GBE) Mozambique builds upon the existing EnDev structures for the implementation of its interventions and there is a close synergistic collaboration between the two programmes in terms of planning, type of interventions and execution modalities. While EnDev focuses on household energy access, GBE focuses on RE capacity development and business creation through electricity access. EnDev will complement GBE's activities to provide electricity access for social infrastructures and productive use of energy provided by also promoting cooking technologies among this target group. The different foci allow the programmes to complement each other, enhance each other's effectiveness and take advantage of synergies (while avoiding double counting of results). For instance, the close collaboration between the programmes was key to the establishment of the FASER RBF fund in 2019. In 2020, GBE joined the basket fund and the EU decided to scale-up the CovidPlus incentive in 2021. EnDev also cooperates closely with GET.invest, assisting companies to gain access to finance through bankable business models and projects. GET.transform and EnDev plan to collaborate on providing policy advisory to the Government of Mozambique to set up attractive policy and regulatory framework conditions for decentralised energy development. All three programmes cooperated in supporting the establishment of a GIS-based planning tool for Electricidade de Mocambique (EDM) to facilitate (notably rural) electrification planning.

EnDev is part of the **Energy Sector Working Group (ESWG)**, together with all other major players in the energy access sector (EU, Italian Development Cooperation, UK Aid/FCDO (Foreign, Commonwealth and Development Office, former DFID), World Bank). The ESWG was established to promote the coordination and harmonisation of all donors' interventions towards universal access to energy by 2030. The ESWG ensures that objectives and programme/project designed are sufficiently coordinated to avoid duplicating structures and to create synergies and joint action. For instance, currently, the group is working with the government on getting taxes and duties on renewable energy products reduced or abolished, in order to improve their profitability.

Within the framework of the strategic partnership between **GIZ and Sasol**, 2 GIZ programmes will be responsible for implementing the pillars of the Sasol social development programme in their area of intervention. EnDev is in charge of the energy access pillar. Through this cooperation, EnDev and Energy for Development (E4D) have already successfully assisted private companies in expanding their activities with a strong focus on job creation (E4D) and energy access (EnDev – Electricity & Cooking) - combining the targets of different programmes. EnDev is planning to collaborate with an experienced nano-grid implementer to pilot the approach of a micro-franchise model operated. EnDev's role is to support

the energy access component and resumes the responsibility to monitor the respective results of people gaining access to electricity or clean cooking.

Furthermore, a **data platform** developed under **FASER** has made it possible to crosscheck results reported by the existing energy programmes and thereby reduce the risk of double counting and increasing accountability and transparency of results every time new data is uploaded. The data platform will therefore enhance sector cooperation and alignment for future programmes to be launched in Mozambique.

In the **electricity/off-grid sector**, EnDev Mozambique collaborates with the **World Bank** that started a new programme, the Energy for All (ProEnergia) Project, in 2020, the objective of which is to increase access to electricity services in Mozambique. The grid connections in Mozambique currently stand at 36% and are expected to reach 50% by 2030, which will cost utility EDM an estimated six billion USD. Hence, even with a World Bank programme in Mozambique (volume <100 million USD) targeting grid extension, reaching this target remains a challenging task. EnDev therefore complements those efforts with its cost-efficient grid densification measures in areas not covered by the ProEnergia project.

In the **cooking sector**, EnDev Mozambique collaborates with the World Food Programme (WFP), promoting institutional cookstoves for schools by providing TA and FA. The WFP is funding the national school feeding programme (NSFP) and will also cover the costs for the provision of the institutional stoves. EnDev will provide technical assistance regarding training and technology.

Furthermore, EnDev receives additional funds to the EnDev core funding. The following donors already contributed, it is envisioned to identify and attract others as well:

- BMZ provided financing to introduce the CovidPlus incentive under the Humanitarian Window of the FASER Fund.
- Delegation of the European Union to Mozambique: provide financing to up-scale the CovidPlus incentive.
- NORAD: provide financing to set up the Humanitarian Window and the CovidPay Window of the FASER Fund.

### **1.13.5 Modalities**

EnDev Mozambique follows a holistic, multi-tier approach, covering different electrification and clean cooking technologies.

The key interventions areas are:

- Access to finance
- Business Development Services
- Evidence, learning transfer and innovation
- Policy advice and capacity development
- Partnerships and alliances



## Access to finance

**Financial assistance** (FA) will be given through the ACCESS window of the results-based financing fund FASER and Integrated Development Partnership (iDPPs). iDPPs are used to support companies to expand their operations into new business areas.

The RBF Fund (**FASER**) has different financing windows with the overall aim of stimulating the value and distribution chains of renewable energy technology markets in Mozambique by incentivising RE companies to expand to less favourable and less cost-efficient market environments, such as remote rural areas where operational costs are higher. Next to a base incentive, companies can receive additional incentives if they can provide enhanced results: access to people in very remote areas, in resettlement areas, with higher tier products or women-led households. The fund is managed by the Foundation for Community Development (FDC). Especially for reaching the rural women households, the contracted companies are encouraged to use non-traditional payment methods such as PAYG and women's saving group for tapping on the collective buying power of rural women.

With the EnDev-funded Access Window, FASER targets the cost-efficient commercialisation of Solar PV systems and of clean cooking technologies for households in off-grid urban, peri-urban and rural areas all over Mozambique.

EnDev also funds the Humanitarian Window of FASER to provide energy access in **humanitarian settings**, such as the resettlement areas for IDPs, which were homeless after the tropical cyclone IDAI hit Mozambique in 2019 and the terrorist attacks intensified in Cabo Delgado. While support is given to both ICS as well as SHS providers, companies are encouraged to bundle and commercialise both technologies in instalments or under a PAYG scheme, to increase their affordability for IDPs significantly. In response to the COVID-19 pandemic and its macro-economic impact, the Humanitarian Window has been extended to cover complete Mozambique. Further, a new CovidPlus incentive was introduced into the Humanitarian Window. The CovidPlus incentive provides grants to energy technology and service providers, which must be partially passed on to the customers, thereby allowing the households to secure access to energy at a very low cost. Additionally, a new CovidPay Window was introduced to FASER, aiming at preventing the bankruptcy of PAYG companies in Mozambique during the COVID-19 pandemic. This will ensure that their clients can maintain their energy access during the pandemic. The rationale behind this market-based approach is the increased sense of ownership and appreciation of beneficiaries for technologies which do not come for free. Additionally, maintaining a market-based approach, even if highly subsidised, shall prevent that future markets are spoiled.

FASER also contains a productive use of energy (PUE Window) which is financed by GBE (until mid-2022), however EnDev will be ready to take over. This window targets the promotion of solar PV solutions for commercial businesses in rural areas for them to profit from productive use of energy (PUE window).

FASER has proven to be an effective financial support mechanism to support the private sector to expand to rural areas, which would otherwise be left behind. Since its launch in July 2019, over 100,000 people have gained access to energy via FASER.

EnDev conducts yearly gender-segregated analysis of past RBF funded companies as well as applicants to understand the gender linked barriers for accessing RBF funding and how it can be overcome to encourage equal participation of female owned companies. The learnings will help to understand if female-led businesses require additional financing or business development coaching before they qualify for RBF financing. While promoting PUE activities, EnDev will aim to increase female participation in non-traditional PUE activities challenging existing gender norms and avoid male appropriation of newly introduced PUE appliances ensuring that certain appliances are not distributed to only men or women – creating gender roles for a certain appliance e.g. a refrigerator.

To improve the access to **grid electricity**, EnDev financially supports the national utility EDM to connect low-income households to the national grid. The financial support paid to EDM is partially covering the costs for the connection of households, which are eligible for EDM's social tariff. In December 2020, the Mozambican government announced that all house connections will be free of charge. However, it has not yet been communicated, how those costs will be covered and how that will affect the revenues of EDM. EnDev will adapt its strategy accordingly. For new connections, EnDev will try to encourage **EDM** to proactively target and prioritise female-headed households.

End-consumer finance is key especially for the uptake of PUE appliances/technologies by BoP clients. EnDev will use the CREDELEC **prepaid energy sales platform** from the Mozambican utility EDM to allow EDM clients to purchase PUE equipment and EE appliances in instalments, thereby reducing upfront payments significantly. The selection of the PUE equipment offered will be gender-sensitive. The remaining payments are considered as a debt in the CREDELEC platform. Along with monthly energy-voucher purchases a certain amount will be used to repay the debt. EDM will function as a service provider, transferring the instalment payments to the private sector supplier of the appliances. It is planned to set-up a revolving fund to finance the appliances and for the collection of the returning debt payments of the clients. The revolving fund will be initially funded by EnDev. In a first phase, the default/credit risk will be assumed by the revolving fund thus de-risking private sector actors. The enforcement of credit payback through the connection of energy-access and debt-payment has the potential to significantly reduce credit default rates, hence lowering the needed risk premiums and thus making instalment-based retailing more interesting for suppliers, as well as clients.

The services offered by the BDS component are aimed at the same companies that are advised for access to finance. Hence, both components complement each other.

### **Business Development Services**

EnDev offers Business Development Services (BDS) for the cooking and electricity sector. Typically, the level and kind of **business development needs** differ from company to company, as their business maturity, business model and objectives vary. Hence, **BDS** rendered are tailored exactly to their specific support needs. BDS may include:

- Early-stage, business conceptualisation and start-up support (especially for ICS)
- One-to-one advisory
- TA for product development and/or towards industrialisation of production

- TA for business model development
- Training in management or technical skills
- Business Match-making, peer to peer exchanges and other B2B measures

Through these services, EnDev prepares companies to effectively attract and absorb additional funding and has already successfully enabled companies to access funds from other donors, matching funding and credit lines for renewable energies through the TA provided.

Additionally, EnDev Mozambique will offer **TA for product development** and/or towards industrialisation of production. This will strengthen the support to private sector companies in the design, marketing and sales of semi-industrial produced charcoal and firewood PUE-ICS, which can be used by businesses (e.g. street-vendors) and by social institutions. Especially larger industrial ICS have a significant potential to mitigate climate change as far less fuel is burned.

Further, together with the GIZ E4D programme, EnDev supports SMEs to act as independent nano energy providers (INEP) to run nano-grids and provide electricity to private households and small businesses. Attention will be given to women-led SMEs. The approach is based on a micro-franchise model that provides important experiences in know-how, structure, **business models**, investment and support. Using swarm-based technology, nano-grid can be scaled up according to demand.

Furthermore, EnDev organises **business matchmaking** (B2B) events with the aim to create strong relationships, synergies and opportunities that lead to greater penetration in rural markets and to greater efficiencies and profits for the companies. These networking opportunities typically connect different types of companies, e. g. small businesses with major corporations, or solar companies with clean cooking business partners for the bundled sales of their products and services.

**Peer-to-peer exchange** facilitated by EnDev brings together similar companies that engage in exchange over energy access challenges, experiences and provide feedback to one another. The promotion of partnerships between companies will lead to a more efficient value chain hence increasing profitability for the companies. The approach of EnDev will enable companies to reach the energy poor with limited economic resources to be reached with cheaper prices and higher tier products. EnDev will continue actively promoting the collaboration/B2B exchanges within distributors of ICS and PAYGO companies for solar PV. EnDev particularly encourages the **bundling of ICS and SHS**, disseminated as a “package”, next to individual sales of these technologies. EnDev supports private companies which market these technologies in establishing strategic partnerships and to develop joint PAYGO models. This bundling approach has many advantages: small companies or NGOs that typically commercialise ICS do not have the financial capacity to offer consumer financing. The bundling approach allows ICS providers to benefit from the PAYGO financing schemes that Solar PV companies offer to households. Furthermore, the bundling allows for an integral marketing of both technologies, offering households a wholesome shift to a more “modern”, efficient and qualitatively better energy provision, while only having to deal with one counterpart. From piloting the bundling approach, it became evident that many households that would perhaps not have considered investing in an ICS were more willing to do so when it

was part of a package. This approach has thus the potential to reach more households than when commercialising both technologies separately. Last but not least, energy access and related results (such as better health, improved framework conditions for women, etc.) can be achieved in a more cost-efficient way. The promotion of partnerships between clean cooking technology companies and solar technology providers will result in reduced operational costs hence a more cost efficient and profitable value chain.

### **Evidence, learning transfer and innovation**

In Mozambique knowledge about market entry opportunities, regulations, and informal and formal market processes have not yet been sufficiently analysed, documented and made publicly available. Therefore, EnDev will take a leading role in enhancing the evidence base, promoting research and development, learning and the transfer of knowledge and learning, as well as innovation. This is done through strategic partnerships, where possible, to ensure that the knowledge is rooted locally.

EnDev gives **technical assistance to the Biomass Energy Certification and Testing Centre** of the Eduardo Mondlane University on standardisation of production and quality control of improved cookstoves. A pilot study should showcase that alternative fuels and technology are developed, tested and available at competitive prices. Furthermore, EnDev supports the University Eduardo Mondlane as well in setting-up a quality testing laboratory for solar off-grid lighting products (PV-lab) with the objective of contributing to a sustainable market development for quality solar lighting products.

EnDev also provides on-the-job training and capacity building to the **FASER Fund's administrator Foundation for Community Development (FDC)**. Through this role, FDC is enhancing their capacity to manage and oversee the implementation of a renewable energy and energy access focused fund, a sector in which they were not active before 2017. Furthermore, the RBF approach is also new to FDC. Through this collaboration they will be able to replicate and manage similar RBF-based funds for other sectors and initiatives. Furthermore, EnDev also supports the **Government of Mozambique** with its monitoring expertise to allow for a sector-wide, coordinated tracking of the targets of SDG7. On a digital platform, universal access to energy in Mozambique will be documented, allowing for visualisations of regional progresses on provincial level and tier level.

Furthermore, EnDev provides information and resources on **specific topics**. For instance, the GIS planning tool which allows the nation-wide identification of potential electrification sites based on GIS data regarding population densities and distance to the utility grid. By active collaboration, all stakeholders involved share their knowledge and can coordinate their activities in a more efficient way.

EnDev also plans to research the potential for using Certified Emission Reduction schemes (**CER**) to provide a means of financing for repairs and replacement of existent cooking energy systems for social institutions, especially health centres. Maintenance is a major problem with improved cookstoves in social institutions, hence EnDev will research the possibility of using revenues from CERs from institutional stoves for maintenance. Additionally, EnDev will continue to enable access to additional funds (carbon credits) to the sector and this will ensure the replacement of ICS for households.

In order to strengthen the sector's capacity for **knowledge exchange**, EnDev – together with GBE – will support the development of a knowledge sharing strategy that should lead to a series of exchange events and a platform for all sector participants to document and share their experience. During the COVID-19 pandemic, these events could be organised online as fast responses and innovative ideas spreading among all relevant stakeholders is more relevant than ever.

EnDev will further support international companies who have shown interest in entering the clean cooking energy sector in Mozambique with market information where available or assistance to carry out feasibility studies to enable them to develop bankable projects. Furthermore, knowledge about the different business cases including best-practice examples will be made publicly available for energy access start-ups and existing companies. These could entail **knowledge insights** with information about improved cooking solutions, off-grid PV technologies, nano-grids for energy service providers, but also information on energy efficiency and energy use cases for companies who use energy in a productive way. These would be tailored to various target groups (companies, banks, students, policy-makers, the general public, etc.) and take different forms, such as a regular newsletter, webinar series, policy papers, matchmaking events, internships and employee exchange.

**On the demand side**, EnDev will support awareness campaigns and **demand activation activities** for PUE for both technologies, electricity and cooking, in rural and peri-urban areas. EnDev will expand successful strategic alliances (e.g. KULIMA) to encourage organisations already working closely with communities to act as access vehicles capable of transmitting, training and sensitising users on the use and benefits of clean cooking technologies and electricity, respectively. Special attention will be made to target female users in awareness campaigns and trainings.

Through the EnDev innovation fund competitive process, EnDev Mozambique secured funding for an E-cooking pilot. The project was due to launch in early 2019 but due to COVID the roll-out had to be delayed. EnDev will engage in the field of **E-cooking**, which is generally believed to be more expensive than cooking with charcoal in Mozambique. EnDev, in close cooperation with EDM, will carry out a pilot on the feasibility of introducing electric stoves in the areas where grid densification activities are being carried out. EnDev currently supports EDM in connecting poor households living in areas where the grid already exists but the families cannot afford the initial connection fees.

### **Policy advice and capacity development**

All interventions will be more effective when backed by a government that is sensitive to the needs of the private sector for a clear, fair and transparent business environment. However, energy targets, policy, institutional framework and roles are unclear, leading to uncertainty in doing business.

Currently, EnDev **advocates** for an increased (private) RE share in the electricity law, which is under revision. EnDev also lobbies for tax exemptions for the import of quality lighting and cooking products. Furthermore, EnDev lobbies for regulators to enforce quality measures, such as the development of national standards for clean cookstoves. To address the



environmental issues with batteries of solar systems, EnDev plans to support the Government in addressing the handling of toxic waste in the respective policies. Furthermore, EnDev will look into the collection and/or recycling potential of batteries.

For island grids, EnDev will advocate for a deregulation of the electricity market in rural areas so that the private sector can implement financially viable island grid electrification projects. EnDev will also coordinate with other donor programmes via the **Energy Sector Working Group** to create a common vision and advocate for sound and supportive policies in the sector. Additionally, EnDev will conduct stakeholder workshops with representatives of financial sector, public sector and private sector with the aim to create a common understanding of the market needs and current obstacles, in order to improve the existing regulatory framework.

Furthermore, EnDev will install a **helpdesk** for the Ministry of Energy that will not only provide concepts but give feedback to all relevant donor-financed propositions to enhance the capacity of Governmental staff to assess propositions with a critical perspective.

### **Partnerships and alliances**

EnDev works with partners and makes strategic alliances in order to maximise its long-term impact and sustainability.

Furthermore, EnDev Mozambique plans to collaborate with **UNHCR and CARITAS** in enhancing the access to cooking energy and electricity in settlements for displaced people. UNHCR will coordinate the activities within the settlement areas. Since CARITAS is already active in the resettlement areas, they will be in charge of the community development measures of this project. EnDev will provide technical and financial assistance by training the end-users and linking-up the solar and stove companies to the project.

EnDev jointly manages the ICS quality testing and innovation lab with the **University Eduardo Mondlane** and the **National Institute for Normalization and Quality** (INNOQ) in order to improve quality, efficiency and durability of locally produced ICS. EnDev supports the lab with an international expert providing technical assistance and capacity building. Furthermore, a consortium of institutions is involved in the development of national standards for ICS: EnDev coordinates involved partners INNOQ, UEM, Ministry of Health (MISAU) and Ministry of Energy (MIREME, Ministério dos Recursos Minerais e Energia), and supports the development of a national standard with TA.

As part of these SI measures, EnDev will support the **National School Feeding Programme** (NSFP) with the design of a new institutional improved cook stove, which will be piloted at the primary school of Chiango in the city of Maputo in collaboration with the World Food Programme (WFP). After successful deployment of the new stove design, it is planned to upscale that project in collaboration with the Ministry of Education and Human Development (MINEDH) by replication in other primary schools throughout Mozambique. Further, EnDev will support MINEDH with the electrification of rural schools, that are reconstructed in a resilient way, after the cyclones IDAI and Kenneth hit Mozambique in 2019. In a first step, an initial set of schools will be identified to be electrified using decentralised RE

technologies. After successful electrification of the first set of schools it is planned to replicate that project in collaboration with MINEDH.

### 1.13.6 Results

Project results	Targets
People: Access to Electricity	60,000
People: Access to Cooking	14,000
SI: Access to Electricity	
SI: Access to Cooking	30
PU: Access to Electricity	10
PU: Access to Cooking	

Further quantitative results include:

- Universal access platform
- Data platform
- National standards
- Knowledge platform for Mozambique including market insights for ICS

EnDev Mozambique is implemented through EnDev core funding as well as other financial resources from e.g. BMZ, EU, NORAD (see chapter Collaboration). The implementation and results are complementary to each other.

### 1.13.7 Sustainability

#### Electricity

The **sustainability of the energy access sector** in Mozambique will depend on the involvement of the national entities and other key actors, as well as on the profitability and effectiveness of the energy access products. Lobbying by EnDev Mozambique at Governmental Agencies, e.g. the Ministry of Energy and/or Health to focus their efforts towards including energy access as targets, within policies and technical standards is a long-term effort. Currently, EnDev supports with advising on the revision of the electricity law in 2020. Continued coordination of the support with all relevant stakeholders in the ESWG will create synergies in the energy access sector. Integrating several national institutions into the interventions leads to a strong national stakeholder landscape. National institutions e.g. the University and the national utility EDM have institutional knowledge of current projects and innovative approaches.

Regarding institutional sustainability of the private sector, EnDev focuses on capacity building in technical and business skills, e.g. solar distributors and retail teams are empowered to deliver quality services. EnDev's intervention approach is designed in a way that distribution/retail structures are strengthened and independently managed, and capacities are sustainably increased through trainings and tailored coaching depending on the needs of the company.



On the public sector side, EnDev's sustainability measures include capacity building in UEM (Universidade Eduardo Mondlane), the national energy fund (Fundo Nacional de Energia, FUNAE), Ministry of Energy and AMER. Thus, EnDev Mozambique is laying the basis for a solid knowledge and awareness basis for the importance and continued support of the energy access sector in various institutions from academia and public sector.

The **sustainability of the market** is supported by working with companies to enhance their level of professionalism in order for them to maintain and expand their market positions. EnDev seeks to ensure the financial sustainability of the project results by promotion of B2B cooperation within the value chain, which is believed to be key in the development of a sustainable inclusive market. The promotion of B2B partnerships lead to strategic alliances and lifting of synergies hence the creation of a more efficient and profitable value chain. Furthermore, technical assistance is given to private companies in financial management, which will lead to efficient working methods thereby resulting in an increased financial sustainability of the companies and a capacity to absorb and attract additional financing. So far, already two companies could leverage on the EnDev provision of financial assistance and obtained substantial financing from external sources.

Financial assistance given to companies during the expansion phase allows them to work in less favourable markets especially rural areas and set-up retail structures, which in the long run can be managed sustainably without further financial assistance. The experience from incorporating financial assistance by EnDev also enables them to absorb additional external funding more easily. On the household level reduced spending for access to electricity will result in increased disposable income for the families.

Technological Sustainability is ensured by only supporting certified technologies. If not certified, EnDev ensures the development/marketing of high-quality products by setting standards for the companies.

Although the financial support for social infrastructure component is certainly not met with a market-based approach, it might create additional market shares in the area for those companies installing the energy technologies. They can also target the households of students, personnel and clients to sell their products. Other commercial businesses in close proximity of an electrified school or health centre might be interested to act as an anchor load for a nano-grid in the area.

Regarding the **sustainability of use**, a large majority of systems sold has not yet reached the end of their lifespan, hence replacement is a minor topic and not frequently observed in the market. However, a survey in February 2020 revealed that the willingness to pay for SHS is quite high. The people understand the relevance of quality, and about the benefits as companies invest a lot in usage trainings. Even with lower ability to pay of potential customers due to the COVID-19 crisis, survey participants still have great interest in SHS. The CovidPlus and CovidPay measures taken by EnDev will ensure the maintenance of already reached levels of access during the pandemic and preventing companies going into bankruptcy.

Ecological Sustainability measures include the support to the creation of a battery collection facility with the objective of recycling used solar batteries. The Government needs to be

made aware about this topic and in the long run, toxic waste should be addressed by policies, so that batteries can be collected and/or recycled.

## Cooking

The **sustainability of the energy access sector** in Mozambique will depend on the involvement of national entities. A greater recognition of cooking energy is an important factor for reaching the SDG7 targets in Mozambique and an aspect that Mozambique actively advocates for.

In the long-run, existing data within the national agencies could be used to install national ICS subsidies (that in turn prevent health expenses and losses due to energy inefficiency). Integrating several national institutions into the interventions leads to a strong national stakeholder landscape with an institutional knowledge of current projects and innovative approaches, e.g. the National Bureau of Standards, the University and NGOs like KULIMA. The **sustainability of the market** is improved by supporting companies to enhance their level of professionalism in order for them to maintain and expand their market positions. Financial Sustainability measures of the Cooking interventions contain the promotion of B2B cooperation within the value chain, which is believed to be key in the development of a sustainable inclusive market. Furthermore, technical assistance is given to private companies in financial management which will lead to efficient working methods thereby resulting in an increased financial sustainability of the companies. The experience from incorporating financial assistance by EnDev also enables them to absorb external funding more easily. The professionalisation of all actors along the value chain will enhance the productivity and therefore capacity within Mozambique. Bigger companies with a proven track record are more likely to obtain bankable financing by the financial sector. Bundling of stoves with solar systems will increase the purchasing capacity, leading to more consumers buying clean cooking technologies.

Regarding Institutional Sustainability of the private sector, EnDev focuses on capacity building in technical and business skills, e.g. local stove producers/distributors are empowered to deliver quality services and products in the long term. In addition, EnDev's intervention approach is designed such that production and distribution structures are strengthened and independently managed, and capacities are sustainably increased. On the public sector side, EnDev's sustainability measures include capacity building in UEM (Universidade Eduardo Mondlane), INNOQ (Instituto Nacional de Normalização), BECT (Biomass Energy Certification & Testing Center), FUNAE, Ministry of Energy and AMER. Thus, EnDev Mozambique is laying the basis for a solid knowledge and awareness basis in various institutions from academia and public sector.

For clean cooking, Ecological Sustainability measures include the support of partners in gaining access to carbon credit financing for their projects. This strategy allows the programme to promote higher tier ICS at an affordable price. Furthermore, for continued gold-standard carbon credit financing, an effective replacement strategy needs to be established which will be monitored by an independent third party, thus leading to a self-sustained project design. One company, MozCarbon, already received incentives for over 30,000 improved cookstoves. The revenue from credits from certified emission reductions are used to offset the prices of improved cookstoves hence serving as end consumer finance

mechanism for clients of ICS. Due to the rigorous verification audit methods is ensuring the continued use of ICS by ensuring replacement of broken stoves hence bringing supplier and clients closer. Endeavour will continue to support such initiatives so as to guarantee continued access to clean cooking energy.

Technological Sustainability measures include technical assistance for standardised production of local ICS technologies which are adapted to users necessities will lead to greater user satisfaction and demand creating a sustainable market.

The **sustainability of use** is high: 96% reported to use their wood fuel stove regularly (at least once a day) for cooking, for other activities like warming water, stove stacking might happen. Even with stacking, the usage of charcoal ICS increases as it saves money (due to increasing fuel prices, charcoal). Users have wide knowledge about the usage and maintenance of their ICS, businesses train them to avoid repairs. A study revealed a real lifespan of over 4 years on average. After the life-span of an ICS ends, businesses have statistics on 75% of earlier customers purchasing a (even different model) replacement stove.

The economic challenges created by the COVID-19 pandemic have led many consumers to reprioritise their needs leaving energy access well down the list. This has led to less spending on improving their energy access consequently leading to fewer new customers, existing consumers struggling to maintain and lower sales volumes for the technology providers. The measure CovidPlus taken by Endeavour through the COVID-19 activities will ensure the maintenance of already reached levels of access during the pandemic and preventing companies going into bankruptcy.

### **Exit and handover strategy**

Endeavour's intervention to developing a sustainable market focuses on capacity building of the supported actors, so that they have the knowledge and capacity to continue to develop and drive a sustainable business model, which will serve the market even beyond the implementation phase of Endeavour. Therefore, the holistic approach of Endeavour Mozambique constitutes the exit strategy. The programme designs support strategies to cater to the needs of the sector. For example, the RBF fund is organised as a basket fund and is open to contributions from other development partners. This leads to sector objectives being aligned with Endeavour's objectives and for activities financed by other donors to follow the same rigorous RBF regime of claim-verification-disbursement. Another example is the data platform to avoid double-counting and the knowledge sharing platforms. While continuously collecting information about the relevant needs and challenges of the partners, the project carefully identifies the areas where more attention is needed to ensure a successful and efficient deployment. The project always bears in mind that the measures do not distort the market and can be removed without collapsing the system. Endeavour's exit strategy ensures that through engaging local staff and partners, skills and expertise are built and maintained in the country, contributing to the ongoing development of Mozambique.

### **Potential Covid support measures**

The worldwide COVID-19 pandemic will continue having a significant global economic impact and already economically weak countries, such as Mozambique, are expected to be hit hardest. Consumers and especially low-income households are forced to reprioritise their households spending and not be able to continue paying for certain services. These factors

will consequentially lead to a winddown or even shutdown of business activities for a yet unknown period of time and many businesses will likely be heavily affected.

The sector support mechanisms CovidPlus and CovidPay, introduced by EnDev Mozambique under the Humanitarian Window of the operational RBF Fund FASER, were essential to avoid reversing progress in the sector and ensure continuity towards energy access. With additional funding, both mechanisms could be easily upscaled.

Access to clean energy is key for powering health and operational facilities (e.g. laboratories and blood banks) and for cold storage for vaccines, mobility (transport of vaccines). Lack of or unreliable energy also results in breakdown of medical equipment, hampering the health service delivery. As COVID-19 measures, GBE already electrified health centres in 2020 to ensure a better health service to the population in Mozambique. EnDev could easily upscale those activities.

To foster income generating activities in humanitarian settings, EnDev could also support the distribution of PUE equipment such as PV-driven sewing machines or barber tools like electric haircutters. Thereby aiming for the economic inclusion of the target group by allowing a shift from being aid-dependent towards economic self-sufficiency.

### **1.13.8 Gender Strategy and Safeguards**

The Gender analysis of the sector conducted in 2021 gives recommendations on how to improve the monitoring and implementation activities for EnDev Mozambique. EnDev is aware of the need to include gender-responsive and gender transformative approaches in all its components and is already taking steps in that direction by collecting gender-disaggregated data. The report identified that there is no consolidated gender mainstreaming yet among all partner organisations. The report also showed that there is a widespread gender disparity between men and women in Mozambique and this disparity is more prominent in rural areas. EnDev's gender strategy will take this into account to ensure that the proposed activities uplift women and do not contribute to widening the existing gap. Access to or lack of energy affects men and women differently. 96% of Mozambicans still use solid fuel for cooking – leading to respiratory and health concerns. Only 28% of the population have access to electricity (Clean Cooking Alliance homepage). Thus, EnDev will use a gendered approach to encourage participation of both men and women equally in the ICS and SHS value chain by providing equal opportunities for BDS, RBF financing and encouraging contracted product providers to reach both last mile men and women and unlock productive end uses. In-cooperating women along the energy value chain is key for unlocking new opportunities and achieving SDG7.

Women are not a homogenous group and their needs vary depending on factors like economic background, age and culture. Thus, a consolidated monitoring system with gender-disaggregated data of the end-users and data from women employed in the value chain is key because it allows EnDev to analyse the changes and impacts related to energy access and economic empowerment of women. Therefore, EnDev's strategy is to enhance the availability of gender-disaggregated data of companies. Via the contracted companies and Electricidade de Moçambique (EDM), it has been tracking the number of off-grid systems (solar

and ICS) sold to women as well as new grid connection made to female households. The data collection improved drastically in the past few years: while in 2014 only 20% of the data reported by companies can be disaggregated, by 2020 all partners include gender-disaggregated data. Companies have gained more experience with collecting customer data. Over the years, the share of women buying the ICS has not changed (66%), while solar systems tend to be bought more by men (67%). However, the main beneficiary is not necessarily identical with the person who purchases the system. The strategy is that by obliging them to collect gender sensitive data, companies will have the topic on their agenda. This will further contribute to designing gender sensitive outreach and end user financing strategies for last-mile consumers e. g. choosing time and place convenient for women for trainings/market demonstrations and collaborating with existing women's groups/livelihood programmes.

Although very little information is available to give a detailed account on the status of gender equality in each partner organisation, counterparts interviewed seem to be sensible to the topic and were able to provide some examples/statements related to gender. SolarWorks! has a female employee share of more than 41% in its structures in Mozambique.

MozCarbon employs about 70% female staff, mainly in the category of sales promoters. Especially in the cooking sector, companies have recognised that women can serve as spokespeople for use of clean energy, endorsing marketing messages and using women-to-women communication strategies. To further strengthen gender equity within the partner organisations, EnDev plans to include additional gender safeguard mechanisms during partner selection. Examples are adding gender sensitive text such as voluntary obligations to strengthen gender diversity within the company or NGO; and providing basic WASH facilities like separate toilets for female staff (wherever applicable) in partner and sub-contractor agreements. It will further encourage all contracted companies to employ more women as sales agents for reaching the last mile consumers, include off-grid products tailored to female needs and also design their sales and outreach strategies targeting female customers. Further strategies for involving women in the ICS and SHS value chain are discussed under the different modalities such as access to finance and BDS services.

In Mozambique 36% of the children live in a single-parent household, most often headed by single mothers. The programme provides companies incentives to de-risk female customers living in vulnerable conditions and provide access for the different technologies supported (ICS, solar PV and grid). The concept is applied in all RBF windows of FASER. However, this particular incentive is not yet taken up by the companies as often as assumed. Only around 1% of the claims benefited from the gender-incentive. EnDev will check if the procedures to justify the incentives are too complex.


For the RBF window, EnDev will use new outreach channels such as existing women's business networks to encourage participation of more women-led businesses and also explicitly invite participation from female-led business in all calls for funding/opportunity. It will also analyse the gender-linked barriers of RBF windows to ensure equal participation of both men and female led companies. It will also aim to support PUE businesses that spark greater participation of women and has a high impact on their livelihood. E.g. solar powered dryers for salons and agro-processing units, such as cassava milling. Innovative financing mechanisms, such as women's cooperatives, saving and credit groups (xitique), agency banking

(Zoon and Letshego) will be explored for providing end-use consumer financing to rural women.

EnDev will tackle the lack of consistent data linking renewable energy and gender issues in Mozambique, especially but not limited to the level of implementing partners. Further research areas are: the potential collaboration options along the energy value chain (with gender experienced organisations), the types of typical women entrepreneur activities (productive uses of energy), and the access to finance situation for women.

# 1.14 Nepal

## 1.14.1 Summary and key data

Promoted technologies			
Summary of proposed interventions(s)	<p><b>Electricity</b></p> <p><b>Grid Extension Revolving Fund (RF):</b> EnDev will support 6,000 new Household (HHs), 100 Social Institutions (SI) and 800 enterprises with access to electricity. In the new phase EnDev will focus more on technical assistance for handing over the RF to National Association of Community Electricity Users Nepal (NACEUN).</p> <p><b>Grid Extension with Local Government Units (LGU):</b> Nepal is undergoing a federalization process, allocating more power to local government units (LGU). In reaction to this, EnDev’s grant support will initiate to assist in piloting 2 rural municipalities in connecting 2,000 new HHs, 30 SIs and 600 enterprises to grid electricity.</p> <p><b>Densification of Existing grid:</b> Under EnDev’s densification programme households (HHs) are financially assisted under grant support to get access to the existing grid following the Nepal Government &amp; EnDev’s policy of ‘leaving no one behind’. EnDev will provide grant support to 3,000 poor, marginalized and/or natural disaster affected HHs, 50 SIs and 490 enterprises to get connected to electricity.</p> <p><b>Micro Hydro Debt Fund (MHDF):</b> EnDev will continue its support in communities to participate in a Government Support Programme for off grid electrification (Micro &amp; Mini Hydro Projects) by providing access to a loan facility established through the partner agency in commercial partner banks. Under this approach EnDev will support new 5,000 HHs, 20 SI and 600 MSMEs to get access to electricity.</p> <p><b>Pico-hydro:</b> In high hills, pico-hydro schemes will be introduced to provide electricity for remote communities, 1,350 new HHs will have electricity access and 900 HHs will benefit from mechanised agro-processing. 10 agro-processing entrepreneurs, 30 micro-enterprises and 120 part-time employment opportunities will be created/developed.</p> <p><b>Cooking</b></p> <p><b>Cooking ICS:</b> Around 70% of the households in Nepal have no access to improved cooking. As there are limited choices for customers on clean improved stoves, this project aims to further develop a market for at least tier 2 improved cookstoves (ICS) for new 7,500 HHs.</p> <p><b>E-cooking:</b> This component aims to activate a market for e-cooking appliances in Nepal by demonstrating the potential to simultaneously build both demand and supply chain supported by an enabling environment. The proposed interventions will facilitate access to e-cooking to 10,000 HH in Bagmati and Gandaki provinces of Nepal.</p>		
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	65,584	People	<i>vulnerable groups are addressed under densification</i>
Cooking / thermal energy for households	21,293	People	<i>Including a new e-cooking component</i>
Electricity and/or cooking / thermal energy for social infrastructure	1,770	SI	.
Energy for productive use / income generation	6,150	MSMEs	
Project period	01.01.2021 – 31.12.2023	Indicative Budget	3,000,000



## Electricity

**Grid Extension Revolving Fund (RF):** A grid extension RF, set up under EnDev in 2008, provides accessible financing to rural communities, which seek access to the National Electricity Grid. This fund complements the support given by the Government of Nepal through the Community Rural Electrification Programme (CREP), that was initiated in 2002 by the Nepalese Electricity Authority (NEA). Communities (Community Rural Electrification Entities (CREEs)) that request support from CREP are requested to cover 10% of the total grid extension costs by own means. EnDev's RF offers a credit to cover this community equity cost. Through this approach EnDev will support 6,000 new Household (HHs), 100 Social Institutions (SI) and 800 enterprises with access to electricity. Support to new CREEs will concentrate on cooperative model CREEs as encouraged by Community electricity bylaws. In the new phase and in this sub-component, EnDev will focus more on technical assistance for handing over the RF to National Association of Community Electricity Users Nepal (NACEUN) from the Nepalese Electricity Authority (NEA).

**Grid Extension with Local Government Units (LGU):** After announcing a new constitution, Nepal is undergoing a federalization process since April 2017, allocating more power to local government units (LGU). Therefore, the community rural electrification by-law has been amended, and since 2019 municipalities are eligible to function as micro-utilities and take part in the Community Rural Electrification Programme (CREP). In reaction to this, EnDev's grant support will initiate to assist in piloting 2 rural municipalities in connecting 2,000 new HHs, 30 SIs and 600 enterprises to grid electricity.

**Densification of Existing grid:** Under EnDev's densification programme households (HHs) are financially assisted under grant support to get access to the existing grid following the Nepal Government & EnDev's policy of 'leaving no one behind'. Based on previous experience about 8 % of the HHs in rural areas which were already electrified by Community Rural Electricity Entities (CREEs) are still unable to connect to the grid due to the high initial investment costs. Through this approach EnDev will provide grant support to 3,000 poor, marginalized and/or natural disaster affected HHs, 50 SIs and 490 enterprises to get connected to electricity in CREEs and mini hydro projects in rural areas. This component will especially focus on the promotion and support of productive use of energy within CREEs and mini-hydro projects where entrepreneurs are financially constrained to start up their business. By doing this, the project ensures more revenue for these local electricity utilities and enhances sustainability.

**Micro Hydro Debt Fund (MHDF):** EnDev established a MHDF in 2010 to provide energy access to remote communities located at favourable hydropower locations, beyond the reach of the national grid – again, complementing Government support programmes. The majority of rural communities are unable to cover the required share of equity for micro hydro power plant constructions due to high upfront cost. To address this, EnDev will continue its support in communities to participate in a Government Support Programme for off grid electrification (Micro & Mini Hydro Projects) by providing access to a loan facility established through the partner agency in commercial partner banks. Under this approach EnDev will support new 5,000 HHs, 20 SI and 600 MSMEs to get access to electricity.

**Pico-hydro:** In high hills of Provinces Karnali and Sudurpaschim, pico-hydro schemes will be introduced to provide electricity along with mostly existing mechanised agro-processing facilities for remote communities, where neither connection to the national grid nor to micro hydro power is feasible. Pico hydro systems will be in place through either improving existing mechanical mills or installing new pico hydro systems. 1,350 new HHs will have electricity access and 900 HHs will benefit from mechanised agro-processing. 10 agro-processing entrepreneurs, 30 micro-enterprises and 120 part-time employment opportunities will be created/developed.

## Cooking

**Cooking ICS:** Around 70% of the households in Nepal have no access to improved cooking. Inefficient use of firewood adds to the drudgery of women and threatens the fragile natural environment on which people depend. In addition, indoor air pollution caused by using traditional stoves adversely affects human health. As there are limited choices for customers on clean improved stoves, this project aims to further develop a market for at least tier 2 improved cookstoves (ICS) for new 7,500 HHs by incentivizing private sector companies through RBF to enter the market with their products.

**E-cooking:** This component aims to activate a market for e-cooking appliances in Nepal by demonstrating the potential to simultaneously build both demand and supply chain supported by an enabling environment. The proposed interventions will facilitate access to e-cooking to 10,000 HH in Bagmati and Gandaki provinces of Nepal through (i) Raising demand: behaviour change support, Result Based discounts on appliances and electricity use (ii) Increasing reliable supplies: technical assistance to last mile distributors (iii) Fostering an enabling environment: technical assistance to CREEs for reliable electricity, evidence based advocacy, linkages with cooperatives and financial institutions (iv) Gender transformation: agency building to make informed decisions. Under this approach EnDev will support 10,000 HHs and 10 MSMEs as last mile distributors in rural areas.

**Project partner:** Ministry of Energy, Water Resources and Irrigation, Nepal Electricity Authority (NEA), Alternative Energy Promotion Center (AEPC); National Association of Community Electricity Users Nepal (NACEUN), Local Government Units (LGUs) particularly Municipalities, Clean Cooking Alliance (CCA), Practical Action (PA), SNV

## 1.14.2 Theory of change (ToC) and state of market

### Electricity

It is estimated that approximately 10-12% of the total population of Nepal do not have access to electricity. The disparity in access to electricity has long-term implications on social equity and justice. Rural areas of Sudur Pashim, Karnali and province 1 of Nepal are more adversely affected by the lack of limited transmission lines. The Government of Nepal (GoN) implements various programmes to increase the electricity penetration in the rural areas of the country. To strategically support the community's access to grid electricity, the GoN in May 2002 introduced the Community Rural Electrification Programme (CREP) that supports 90 % of the total investment while 10 % are community contribution. In case of off-grid technologies the renewable energy subsidy policy supports small scale hydro development in rural areas with up to 45 – 50 % subsidies to project site. The main barriers to universal access to electricity are the challenging geomorphological conditions in the country with remote locations resulting into high project costs. Though rural electrification has progressed significantly in the last 2 years, the remaining 10 percent of population is very hard to reach. Inadequate technical support, a lack of effective financing mechanism to support rural electrification projects, along with a lack of awareness on policies in place has further slowed down the pace of electrification in those areas.

To address these shortcomings for grid connected access to energy, EnDev provides organizational, technical and financial support to the CREE areas and capacitates CREEs and LGUs to operate as an independent village utility. For the off-grid micro hydro sector, EnDev assists rural communities through the MHDF to repay the high upfront costs over a long period of time and while doing so, encourages commercial banks to finance more MHPs in Nepal. Additionally, pico-hydro projects will be implemented in areas which are too remote for grid connection and MHP development. EnDev will ensure the cooperation among stakeholders for appropriate and sustainable results.

Theory of Change - EnDev [InsEnDev Nepal (Electricity)]			
	Emerging Lives - Social development Better education and social life; Access to better health facilities, Improved lifestyle through use of modern technology	Emerging Opportunities - Economic development Increased income and business expansion; Local economy boost from electrification (less labor intensive works)	Emerging Climate - Combating climate change Reduced use/dependence on fossil fuel based lamps and generators
<b>Impacts</b>			
<b>Assumptions</b>	Rural communities have access to grid and off grid electricity through community electrification projects; Demand for community based electrification project is high especially in province 6 & 7; LGUs utilize their resources for electrification projects; Multiple opportunities for PUE activities are seen at local level	CREEs, MHP user committees are capacitated for smooth management/ operation and are resource efficient/ future expansion/ upgradation; Community are independently operating and managing RE projects;	Credit financing mechanisms are maintained; Continued availability of grant support for poor communities; Rural electrification projects are resource efficient/ future expansion/ upgradation; Private sector willing to invest in rural electrification projects;
<b>Outcome</b>	Increasing share of rural population has access to grid electricity through community managed electricity distribution and supply; Credit financing solution for rural electrification projects are available; Micro-utility activity taking part in rural electrification program & planning processes and Communities successfully operate and maintain CREEs; Rural areas are well equipped in identifying potential electricity generation technologies and policies in place for electrification; LNED principle adopted ensuring equal access to sustainable electricity services to all in rural areas; Financial efficiency and better following of time-planning; Electrification projects as attractive business opportunities;		LGUs function as Communities in Improved project management among electrification projects along with Higher Private sector perceive rural Rural communities sustainably manage renewable energy services
<b>Assumptions</b>	LGUs, rural Communities act as micro-utilities will manage and operate distribution network in their areas; sectors and donors to establish off-grid hydro solutions; sources and other donors will support community electrification projects; loan from commercial banks; Understanding on CREP will drive community based electrification rate & More projects will approach AEPG and other donors for their support; CREE identify poor households in their catchment area which will be supported under identification programmed.	Communities beyond the national grid's reach will be supported with funding from government, private CREEs with fund deficit will receive loan under RF, LGUs, other government Pico hydro projects with fund deficit will receive loan from LFI's;	
<b>Outputs and results</b>	Rural communities have means to extend national transmission and distribution line to their villages; Hydro and Pico Hydro; Commercial banks are investing in MHP projects & LFI's are investing in Pico hydro projects; More rural electrification projects in pipeline as the communities as more aware of the existing policies; connected to existing grid leaving no one behind; Pay back from community is done in regular basis (transparency and sustainability)	Rural communities have access to revolving funds to meet to plug the financial gaps in rural electrification; New enterprise are established and electricity consumption is increased;	Access to electricity to remote areas that are beyond grid's reach through Micro Increased number of MHP sites benefit from AEPG and other donor support; Poor, vulnerable and marginalized households in CREE working area are
<b>Key interventions</b>	Community Rural Electrification Grid Extension Revolving fund to expedite community based grid extension; through Micro Hydro Debt fund to plug the gap funding; institutes (LFIs); NEA/CRED and NACELN; MHP and Pico Hydro sites to provide sustainable electricity for all; Support to poor, marginalized, earthquake affected, single women led households in CREE areas for initial connection through grid identification; Capacity development of participating CREEs, MHP user committees, Pico Hydro user committees, commercial banks, for successful implementation; Advisory support, grant support, facilitate newly established LGUs in coordination with NEA/CRED, AEPG, NACELN; market development; Regular follow up on the loan, rigid management of electricity fee collection and loan repayment	Awareness raising among communities and LGUs on need and importance of community based grid electrification in coordination with Coordination with AEPG and LGUs to raise awareness in rural remote areas to highlight need for off grid technologies Introduction of digital solutions like prepaid meter to regulate tariff collection;	Financial and technical support to commission of Micro Hydro Projects in remote areas Credit financing of Pico hydro projects through Local Financing of community based grid electrification in coordination with MHP projects with fund deficit will receive
<b>Barriers</b>	<b>Supply side barriers</b> Insufficient financing for transmission lines of National Grid in rural areas, Rural population in scattered settlements and difficult geographic terrain cannot be reached by National Grid; Larger off-grid solutions are not viable due to difficult geographical terrain, scattered settlements, Government subsidy, community contribution is inadequate to meet electrification needs ,	<b>Demand side barriers</b> LGUs and communities lack expertise and technical knowledge, Communities from remote locations are unaware about existing support framework offered by governmental and non-governmental agencies for the establishment of off-grid power plants, Poor/marginalized households cannot afford to connect to existing grid,	<b>Enabling environment barriers</b> Absence of decentralized structure of governmental agencies like AEPG to facilitate rural electrification, Low return of investment and high probability in loan default in rural electrification projects
<b>Assumptions</b>	Remoteness and financial resources required to reach rural remote population is high leading to higher equity from rural remote communities which they cannot afford, Local communities are contributing (i.e. in-kind and cash) to electricity development activities, efficiently use the resources and to come up with their own energy plans electrification rate in the country are unaware regarding the need and importance of electricity for socio economic development and the how to tap the existing government policies for electrification, Marginalized and poor areas of the community are left behind (electricity access), Nepal government's policies supports and prioritizes rural electrification, Perceived high risks from private sector resulting low investment due to mismanagement of rural electrification project,		LGUs formed with some structure but they only have limited capacities to Communities especially in province 6 & 7 with lowest Electrification projects are not completed in stipulated time period, Government has adequate resources to fund electrification projects, Community are willing to take ownership of rural electrification projects
<b>Root cause</b>	Rural population has limited access to electricity services households in electrified area still lack access to electricity, existing communities often fail to operate and maintain CREEs successfully, expertise on electricity generation technologies and government policies relating to community based electrification (i.e. MHP, Pico Hydro), Electrification projects are insufficiently managed, delayed, and exceed budgets, commissioning of rural electrification projects; Private sector (Banking and Financial Inst.) perceive rural electrification sector as risky investments, of community based electrification services	LGUs do not have adequate technical expertise and financial resources to execute rural electrification projects; Rural community lacks management and technical skills for sustainable management	Connection rate of households in electrified villages is still low, 8% of the Local Government Units (LGUs) are still in infancy of implementation and Communities in rural areas have limited knowledge and Lack of coordination between intergovernmental agencies for the to execute rural electrification projects; Rural community lacks management and technical skills for sustainable management
<b>Core problem</b>	Government of Nepal's whitepaper (2016) is in line with the goal of SE4ALL initiative and aspires to provide electricity to all by 2030 but the current pace of electrification through on-grid and off-grid intervention in Nepal is insufficient to address electricity need of people in rural Nepal.		

## Cooking

Almost 72% of households in Nepal use solid biomass and the majority of them with inefficient stoves<sup>57</sup> as their primary means of cooking, with many more resorting to them as a secondary option<sup>58</sup>. This causes high levels of Household Air Pollution (HAP), which results in respiratory and other diseases leading to almost 23,000 premature deaths<sup>59</sup> annually in addition to very high morbidity leading to very high health cost in terms of money and time loss. In addition, it places a huge burden on women who spend an average of 3 hours a day collecting fuel and cooking - time that could be used for learning, income earning and social activities. Use of inefficient biomass energy for cooking also has massive adverse environmental impacts through deforestation and emissions of carbon dioxide and “black carbon”.

## ICS

As there are limited choices for customers on improved cookstoves, EnDev aims to further develop a market for improved cookstoves for households by offering increased customer choice, which would include at least to 40% fuel saving.

The ongoing constitutional reform provides unprecedented opportunities to engage (rural) municipalities in the intervention. Since 2019, municipalities have the authority to steer small renewable energy activities, including the promotion of improved cooking, and are provided with dedicated funding from the national government. Once the local authorities will be adequately staffed, they are expected to create an enabling environment for improved cooking.

The project will cooperate with the Alternative Energy Promotion Center (AEPCC) and the Clean Cooking Alliance at the national level, as well as with provincial governments and commercial providers, local financial institutions, and related projects that are at the implementation stage. Financial institutions will provide loans to the providers as well as to the customers. The main modality of the project will be Result Based Financing (RBF).

In addition to direct financial incentives, behavioural change campaigns will be organised, and specific assistance will be provided each to the private sector, municipalities and local financial institutions.

The desired transformation is to have access to improved cooking solutions through changing

Household's behaviour and the establishment of a product for access to financing. The project will also capacitate local government units to have coherent policies in place so that RE technologies are localised and local governments together with local stakeholders can continue the promotion of improved cookstoves.

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<sup>57</sup> Tier 2 or lower according to the SE4All Multi-Tier Framework (MTF) set out in ESMAP (2015) Beyond Connections: Energy Access Redefined

<sup>58</sup> World Bank, 2019, Multi-tier framework survey

<sup>59</sup> WHO, 2016 ([https://www.who.int/healthinfo/global\\_burden\\_disease/estimates/en/](https://www.who.int/healthinfo/global_burden_disease/estimates/en/))

## Theory of Change - EnDev Nepal (ICS)

<b>Impacts</b>	<b>Energising Lives - Social development</b> Reduction in drudgery (time saving), Cleaner indoor environment, Improved health (reduced indoor air pollution); Improved quality of life (time for education/trainings, leisure, safety)	<b>Energising Opportunities - Economic development</b> Increased income (+ time to participate in income generating activities); Increased job in supply chain/manufacturing & production of stoves and entrepreneurship opportunities in local areas	<b>Energising Climate - Combating climate change</b> Reduced Green House Gas emissions; Reduced deforestation & firewood consumption
<b>Assumptions</b>	The market will not be distorted by the distribution of free products and services; Quality efficient clean cooking solutions are available in the rural market throughout the country at an affordable price, demanded by households		
<b>Outcome</b>	Matured market established throughout the country with developed demand & supply chain; Behavioral change in consumers towards clean cooking		
<b>Assumptions</b>	Providers are willing to invest in product development, distribution and after sales services; Enhanced growth of the market for clean cooking		
<b>Outputs and results</b>	Increased number of providers and suppliers of qualified products and services; Households has changed their mind set and purchase and use qualified products.		
<b>Key interventions</b>	Accessible financing options from LFI to create more demand; Behavioral change campaigns targeting households for clean cooking		
<b>Barriers</b>	<b>Supply side barriers</b> Providers of CC limit their business to accessible areas only. Limited options for the users to choose from.	<b>Demand side barriers</b> Households are unaware of the benefits of CC. The user may find up-front cost high for the clean cookstove.	<b>Enabling environment barriers</b> Limited access to financial services; Insufficient capacity and resources of Local governments for integrated and inclusive energy plans; Incentive (on stoves) driven as purchasing power of rural is low or willingness to pay is limited
<b>Assumptions</b>	Private sector do not invest in CC without market assurance, while most households are uninformed, and government support is insufficient		
<b>Root cause</b>	There is very limited demand among household and limited supply choices for potential customers		
<b>Core problem</b>	About 70% of the households in Nepal have no access to clean cooking (CC), severely affecting livelihood, health and the environment		

## **E-cooking**

E-cooking can eliminate harmful emissions<sup>60</sup> and reduce deforestation. More efficient appliances and planned increases in generating capacity (to 5000 MW by 2023/24), emerging changes in transmission and distribution are making a large-scale transition to cooking based on electricity a realistic possibility in Nepal. The key issues that prevent growth of e-cooking in Nepal are limited demand and resistance to change due to limited awareness and knowledge, women's limited access to, and control over household assets, resources and financing, and limited role in household decision making; lack of reliable e-cooking appliances and poor regulatory enabling environment - Insufficient public funding and unreliable electricity supplies.

The proposed theory of change is that if demand and supply of e-cooking appliances is increased, then the adoption rate of households of electric cooking solutions will increase. In this context, the proposed interventions will facilitate access to e-cooking. Behavior change support, women' agency building, RBF incentives and access to credit will raise demand for stoves. Technical assistance to last mile distributors, establishment of after sale services and linkages with global companies will increase the supplies. Technical assistance to CREEs and evidences-based advocacy will create an enabling environment for reliable electricity supply and therefore stove promotion. These will lead to adoption of stoves, increased sales volume of last mile distributors and increased business viability of CREEs which will sustain the market system for stoves with an established demand/supply chain.

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<sup>60</sup> MTF Tier 4+ forms of cooking are needed to have a significant effect on health impacts, according to the World Health Organization (WHO) Air Quality Guidelines, and electricity achieves Tier 5.



## Theory of Change - EnDev Nepal (E-cooking)

	<b>Energising Lives - Social development</b> Improved health conditions and reduced mortality and morbidity through better household air quality; Improved gender equality and gender transformation through women's agency building, reduced drudgeries and increased time saving	<b>Energising Opportunities - Economic development</b> Increased job creation	<b>Energising Climate - Combating climate change</b> Reduced Green House Gas emissions; Reduced deforestation & firewood consumption
<b>Impacts</b>			
<b>Assumptions</b>	Provincial and local governments continue their investment in electric cooking Last mile distributors increase investment on quality efficient e-cook stoves with after sales service in the rural market at an affordable price.		
<b>Outcome</b>	Developed market system of e-cooking with increased adoption rate by households Increased awareness and access to information easily available Increase number of providers and supply of qualified products and services Product service providers are willing to invest in product development, distribution and after sales Local governments are provided with staff, skills and budget to facilitate e-cooking market Financial service providers have high incentive to lend for e-cooking business and distribution Successful business model replicated by other CREEs and utility distributors Sustainable CREEs encourage their users for electric cooking in their area Stakeholder feedback taken positively by policy makers for making policy changes		
<b>Assumptions</b>			
<b>Outputs and results</b>	Adopted efficient and quality e-cooking appliances by 10000 households. Increased sales volume of 10 last mile distributors in rural areas. Increased business viability of 10 CREEs by promotion of e-cooking. At least 10 local financial institutions established loan product for electric cooking appliances and started to provide loan for it. Developed 1 business case on financial sustainability of CREEs.		
<b>Key interventions</b>	Behaviour change campaign and agency building to raise awareness, empower women and increase demand, Result based incentives alongside discount vouchers for appliances and household wiring upgrades to improve affordability; Mentoring and training for last mile distributors and technicians to increase availability of appliances and improve after-sales and repair services Assistance to CREEs for better business planning, improve load management, reinforce distribution systems, carry out household safety audits and upgrade wiring and so improve safety and reliability of electricity supplies Facilitate linkages with financial institutions National multi-stakeholder advocacy campaign and policy dialogues for e-cooking growth		
<b>Barriers</b>	<b>Supply side barriers</b> Limited availability of quality products for e-cooking in rural market Inadequate business skills of supply chain actors, including CREEs	<b>Demand side barriers</b> Lack of knowledge of consumers on adoption of e-cooking	<b>Enabling environment barriers</b> Insufficient capacity and resources of Local governments for integrated and inclusive energy plans Limited access to financial services Limited capacity of electricity distribution infrastructure to meet demand of electric cooking Limited research and development on electric cooking and its viability Limited incentives for rural consumers to use electricity for cooking
<b>Assumptions</b>	Awareness and behavioral change programs are not adequately funded for scale up There is very limited demand among households (m/f) Economies of scale and cooperation are not sufficient for profitable business on e-cooking Local governments depend upon external support to guide them on clean cooking energy agenda Financial institutions perceive high risk on cooking products CREEs struggle for timely operation and maintenance of distribution systems Limited technical assistance is available to strengthen capacity of CREEs		
<b>Root cause</b>	Limited knowldge on safe and multiple use of electricity Limited awareness on health benefits, and expenditure reduction/benefits of e-cooking over existing cooking practice Lack of business model for last mile distributors Clean cooking is not prioritised in local government planning Consumer financing is not sufficiently available for e-cooking products Unreliable electricity supply in rural areas CREEs and utility do not have resources and capacity to promote e-cooking Electricity tariff is perceived expensive due to limited knowledge about its economic and financial benefits Product diversification is not yet there to cater the demand need of users in terms of cooking.		
<b>Core problem</b>	Low adoption of e-cooking solutions likely to delay the 2030 national targets of clean cooking		

Apart of SDG 7 – Affordable and clean energy, the overall project, electrification and clean cooking, will improve gender equality, create jobs, reduce GHG emissions and improve health, and thereby contribute to: SDG 3 - Good health and well-being; SDG 5 - Gender equality and SDG13 - Climate action.

### **1.14.3 Transformative character**

#### **Electricity**

##### **Market Development**

EnDev takes advantage of new opportunities in the context of the recently started decentralisation process on decentralised production and management of energy. EnDev's revolving fund assistance in its on-grid and off-grid component leverages on the national subsidies for investing in electricity infrastructures to expand the electricity market in rural/remote areas. Assistance to CREEs via EnDev's RF for grid extension costs as well as MHDF are both based on a proven track record of EnDev's intervention during the past 10 years and just needs some final consolidation. Particularly, NACEUN, partner banks and MHP utilities still require further assistance to fully take over their foreseen role. CREEs are assisted through capacity building activities and financial support on community contribution for electrification, whereas NACEUN will be supported to manage the RF for the continued electrification process independently. For mini and micro hydro projects, banks will be further supported to reach a position to assess, select and refinance the projects on their own. Grid integration of MHPs opens the national electricity market for the local communities to generate additional revenues. In parallel, new LGU structures require assistance to implement their new mandates. At the same time local manufacturers will produce pico hydro technology as well as turbines for electricity generation, and local consultants will do detailed survey and engineering designs for pico-hydro sites. The components of the mechanical agro processing mills will be manufactured and sold by local enterprises - hence creating a market for this technology which will contribute to employment generation.

##### **Economic development / productive use**

Provision of electricity has a clear economic impact when providing energy at the highest tier to rural areas and particularly through the extension and densification of the grid, through MHP but also through pico-hydro. SMEs benefit from a reliable source of energy to start or intensify their businesses. Further processing of agricultural products, furniture, poultry, hospitality businesses, electronic sales and repair services etc. will be observed that generate more income for the beneficiaries. Access to electricity replaces diesel-based operations for e.g. saw/rice/oil/flour mills. That results in a significant reduction of CO<sub>2</sub> emissions and reduction of operating costs benefitting also customers due to reduced retail prices. The creation of new businesses and technologies in the productive sector brings improvement for the economic status of the households and community. Jobs are being created in value and supply chains and businesses will expand in the project areas. Access to electricity creates opportunities in the communities to boost small businesses like cold stores, hotels, poultry farming, carpentry etc. EnDev Nepal will specifically support productive use of electricity through business trainings and focusing on potential women entrepreneurs.

##### **Social Development**

Access to electricity from the national grid, mini, micro and pico hydro projects provides the rural population with clean energy sources. Similarly, access to electricity significantly contributes to an increased use of information and communication technologies (ICT) along with ubiquitous use of mobile phones and television for communication and information sharing in the daily life of the rural population. New to the scene are computer institutes, cyber cafes, mobile antennas and electronic sales/repair shops which create new job opportunities and revolutionise how the rural population consumes information and communicates to different corners of the world via internet. This flow and easy access to information also empowers women to participate in the decision-making roles in CREEs, MHPs and Pico-hydro's user committee and plays a significant role in their socio-economic development perspective.

Electricity enables overall wellbeing of people from access to quality education to better health services. Health institutions and medical services in the rural community also improves due to access to electricity, being able to offer better, cheaper and prompt treatment facilities due to improved availability of medical equipment. Schools in rural communities will be able to use computers, projectors and the internet for teaching purposes and students can study longer with ease during the night.

### **Poverty alleviation**

EnDev interventions with CREEs/LGUs, mini- micro- and pico hydro projects are primarily focused on the rural population (having a large share of poor and marginalized beneficiaries). In coordination with other stakeholders EnDev will provide financial solutions to this target group along with business development training to foster income generating activities through productive electricity use. EnDev's densification component is providing electricity access to around 8 % of the ultra-poor in CREE areas that are living in close proximity to the national grid. Major portion of the disconnected population belong to marginalized groups like 'Dalits' (so-called low cast), 'Mukta Kamaiya (bonded labour), 'Janajati' (indigenous people) and victims of natural disaster. Following the principle of 'leaving no one behind' EnDev, in close coordination with CREEs and partners, will continue to assist the marginalized to get electricity access. In general, MHPs and Pico-hydro are assisted in remote areas often with no road access, usually inhabited by Nepal's poorer strata of the population, with the advent of electricity in these areas opens up varied avenues for socio-economic development as mentioned above. EnDev also provides technical assistance to MHP user committee to tap into additional government subsidy (eg. GESI and PU) for remote rural communities to reduce financial burden.

## **Cooking**

### **ICS**

#### **Market development**

The project will transform the market of higher tier stoves by extending the variety of choices for customers. For selected areas in province 3 and 4, the project will not only promote tier 2 stoves, but also forced-air and gasifier stoves. For province 6 and 7, the focus will remain on tier 2 stoves, as the baseline in these areas indicated additional challenges on demand side related to poverty and accessibility. The ongoing constitutional reform provides

unprecedented opportunities to engage (rural) municipalities in this intervention, who already showed interest to support the process.

### **Economic development / productive use**

The project will also contribute to poverty alleviation by creating employment, enabling savings on expenditures for fuels and income at the supply side, and by improving health and livelihoods of households using clean cookstoves.

### **Social Development**

The benefits will largely accrue to women through reduction of time and drudgery in relation to the collection of fuel wood and reduced health risks from indoor air pollution. Other benefits for the society at large are reduced deforestation and carbon emission reductions.

### **E-cooking**

#### **Market development**

The project will activate a market structures for e-cooking appliances through adequate support services and creating favourable policy environment. This will contribute to business growth of last mile distributors and increase their investment on stock taking to ensure timely supply and become more responsive towards consumer's preference and needs. Behavioural change campaigns addressing users will support to improve the existing experience of last mile distributors on promotion and marketing of e-cooking. Learnings of this intervention will contribute to leverage and accelerate planned interventions of ESMAP and GCF. EnDev Nepal might also provide technical assistance to local companies to get integrated into future WB financed electric cooking promotion projects.

#### **Economic development**

The project will increase employment opportunities and strengthen productivity of services across the stove supply chain through training to last mile distributors and establishment of repair centres. Use of e-cooking appliances will reduce household expenditure on fuel, fuel collection time, health cost and thus enable savings. EnDev jointly with the respective CREEs will develop business case for strengthening income base of the community and enhancing investment on electricity distribution infrastructure. At the national level, e-cooking will also replace imported LPG and contributes to better foreign currency reserves in the country.

#### **Social Development**

Shift to e-cooking will improve gender equality and gender transformation. Women's improved agency will enable them to make informed choices and decisions for using electric appliances, provides opportunities to engage in e-cooking appliance supply chain and utilising saved time in income generation activities. This will contribute to improve household income. There will be significant reduction in women's' health risks from indoor air pollution. Other benefits for the society are reduced deforestation and carbon emission.

### **Poverty alleviation**

Targeted support to women headed household and Dalits will contribute to poverty alleviation by creating employment, improving health, health cost saving, time saving, drudgery reduction and fuel cost saving by replacing solid biomass fuel and LPG use. With after sales repair centres, and last mile distributions, EnDev will contribute to the job creation and poverty reduction.

## 1.14.4 Collaboration

### Electricity

#### Sector Alignment

All proposed interventions are in line with the objectives of the Nepalese Government as formulated in the 2018 'WHITE PAPER' on energy and the second nationally determined contribution (December 2020). With concern to all components EnDev is closely coordinating and partly cooperating with all relevant GIZ programs such as LPED (Local and Provincial Economic Development) and CD SG (Capacity Development Support to Governance). EnDev particularly aligns with the project on Renewable Energies for Rural Areas (RERA), which strengthens the capacity of AEPC for off grid energy & with the Nepal Energy Efficiency Program (NEEP). EnDev also coordinates with a set of NGOs that have structures in relevant districts such as ABF, PA, SNV, NEF, CCA-Nepal etc.

As for Grid, the national utility NEA continues to be assisted via a RF for the extension of existing distribution system. The government's target to connect 90% of the population to grid electricity by 2023-2024 is benefitting from EnDev's on-grid activities to speed up the electrification of rural Nepal. The process will in future be facilitated and driven by NACEUN, a long-term partner of EnDev Nepal. No other Development Partner is working on this level in Nepal. However, the intervention is complementary to that of Development Banks and donors such as World Bank, ADB, FCDO and KfW who are investing in stabilising the grid and quality supply of energy in Nepal. Other development partners that work on livelihood, poverty alleviation and economic development can use and build up their activities on the impact of EnDev's grid activities.

No other development partner works in the field of densification of the grid component that target in particular the average 8% of rural poorest households within assisted CREEs. EnDev's support shows a pronounced impact on the living conditions of the beneficiaries (leaving no one behind). GoN (NEA) has similar pro-poor intervention and EnDev supplements this activity and contributes to the national and international targets of reaching universal electricity access by 2030.

AEPC promotes Off grid Renewable Energy including solar and ICS since 1996. The second NDC puts emphasis on meeting next decade's energy demand from clean energy sources where maximum of 1,500 MW is to be generated from mini- and micro-hydro power, solar, wind, and bio-energy. In this aspect the EnDev's MHDF & the pico-hydro component complements this mandate in connecting last mile households of Nepal with electricity. Additionally, the expansion of EnDev's portfolio to diversify off grid technology to support also mini hydro power plants through the MHDF also presents good opportunity to work with AEPC to open wider electricity markets.

EnDev activities align with AEPC's agenda which benefits also from capacity development activities by the two GIZ projects RERA & NEEP. EnDev closely coordinates with these programs. RERA also develops mechanisms for a cooperation between AEPC and LGUs on subnational level in Sudur Paschim province and Province 1. EnDev benefits from synergies in these provinces but also applies the mechanisms, tools etc. in other provinces when suitable and feasible. Long term partners of EnDev's RF are banks that are managing the funds and recently also LGUs, which have a stronger mandate and even budgets to assist in the program's activities. The latter is also true for grid extension activities that address poorer households of a community at their outskirts.

### **Implementer base**

EnDev is cooperating with:

- NEA/CRED and NACEUN is supported by GoN for the CREP, where the GoN funds 90 % of the total project cost. EnDev assists with awareness activities and provides the facility for gap financing in addition to that, EnDev also provides financial assistance to poor HHs and HHs affected by natural disasters for electricity access through densification sub-component.
- AEPC is also supported by GoN and other international donors to identify and execute renewable energy projects. EnDev activities align with AEPC's subsidy policy for rural Nepal. EnDev supports AEPC to execute mini-, micro- and pico hydro projects.
- Under the recent constructional reforms LGUs have a stronger mandate to assist the program's activities. The fact that government agencies in charge have now shifted closer to the project sites is perceived as fruitful process by implementers in rural areas. LGUs are more familiar with the situation on the ground and thus in a better position to support.

### **Leverage**

The grid extension RF provides support to the communities to manage their portion of electrification costs required under CREP where the GoN provides the 90 % of the budget required. The RF provides a loan up to 5% of total electrification cost (out of 10% contribution required from beneficiaries) or up to NPR 5,000,000 depending on the total project cost. The assisted community must bear at least 5% of total electrification cost required. The grid densification guideline aims to provide support of at least 50 % connection cost for the households. These 50% costs act as a catalyst money due to which the rural households bring another 50% to get connected to national grid., Without this additional loan possibility, many project sites would not be realized. Grid densification program also helps CREEs to increase their revenue which eventually helps to run sustainably in future.

In case of MHPs, the subsidy amount differs according to technology and region. Generally, subsidies cover 40% of the total costs. Out of the remaining amount, around 30 % is collected from community or households in the form of in-kind and/or cash and the MHDF provides the financing mechanism to fund the remaining 30 % of the budget requirement (leverage of 2-3).

For financing pico-hydro, EnDev will liaise with AEPC and (rural) municipalities. AEPC can provide subsidies to appropriate schemes, while the rural municipalities - based on

decentralized energy policies –provide financial support. Together, both entities will cover 55% of the investment, while the remote communities will contribute 20%. Though the project will make an effort to mobilise a credit scheme for the remaining 25% of the investment, a 25% grant from EnDev is included in the budget. The collaboration with the (rural) municipalities will go beyond financing, as they also have an important role in planning, coordination, reporting and monitoring.

### **Nexuses**

Electricity access to rural area has synergistic interactions with water, energy, education, agriculture and health services, bringing considerable benefits in all key sectors. Rural energy technologies can boost water and food security by improving accessibility, affordability and safety. Integrating rural energy in the health services helps to harness health facilities and reduce the mortality rate and contribute to quality of health services.

## **Cooking**

### **ICS**

#### **Sector alignment**

All proposed interventions are in line with the objectives of the Nepal Government as formulated in the 2018 'WHITE PAPER' on energy. The proposed project will contribute to achieve enhanced NDC targets particularly to achieve the target of improved cookstoves for rural areas. The Government is also committed to provide clean cooking technologies of at least tier - 3 to all households by 2030 (GoN, Biomass Energy Strategy 2017).

For ICS, the project builds on the lessons learned from the UKaid funded "Result Based Financing for Sustainable Improved Cookstoves Market in Nepal" project implemented by EnDev through Practical Action from 2014-2019 in province 3 and 4 and the "Improved Cook Stove Programme with Carbon Finance" implemented by SNV with OFID support in province 7.

#### **Implementer base**

At the national level, coordination will be maintained with AEPC and the Clean Cooking Alliance, in particular on the design of behavioural change communications. Strategic partnership will be strengthened with Hivos/ENERGIA at global level for ensuring gender and social inclusion, and women entrepreneurship development. In the intervention areas, the project will collaborate with all relevant stakeholders and projects including GIZ/RERA in province 7 (capacity building of (rural) municipalities), Rural Village Water Resources Management Project in province 6 and 7 (also promoting improved/clean cooking), NMB managing a RBF fund for province 3 and 4, Clean Start of UNCDF for facilitating linkages with financial institutions and a targeted revolving fund for lending through local financial institutions to providers and consumers of renewable energy including ICS in province 7, and local NGOs (advocacy). Linkages will be facilitated with local financial institutions including cooperatives for consumer financing and lending to private sector. The project will generate a minimum leverage of 1:1 through financing from HHs, municipalities, local financial institutes and private sector.

### **Nexuses**



Clean cooking solutions have strong linkages with human health, deforestation, greenhouse gas (GHG) reduction and financial savings. The benefits of ICS with regard to saving of fire wood and the reduced burden on the forests and their capacity as a sink for GHGs is significant. A reduction of indoor smoke exposure significantly improves the health condition particularly of women and children. Furthermore, an increased application of ICS contributes to economic activities and energy security. Moreover, local employment will be supported, as the clean cook stoves will be produced locally.

## **E-cooking**

### **Sector alignment**

All proposed interventions are in line with the objectives of the Nepal Government as formulated in the 2018 'WHITE PAPER' on energy, "All Households with Electric Stoves" and as envisaged in 15th Periodic Plan (2019/20 to 2023/24) to replace solid biomass with electrical energy and increase consumption of electricity. The Government is also committed to provide clean cooking technologies of at least tier - 3 to all households by 2030 (GoN, Biomass Energy Strategy 2017). The proposed project will contribute to achieve enhanced NDC targets (submitted to UNFCCC) particularly to achieve target of 25 per cent households with e-cooking as a primary cooking mode. The project is in line with FCDO supported Nepal Renewable Energy Programme (NREP) in Province 2,5, and 6, as it will be working on business models of financial service providers to facilitate e-cooking. World Bank's expected upcoming programme on e-cooking and Clean Cooking Alliance's strategy of clean cooking market development.

### **Implementer base**

For electric cooking EnDev was a partner in promotion of electric cooking national campaign along with ABF, CCA, NACEUN & NEA. The project will closely work with the Nepal Electricity Authority (NEA) to ensure timely upgradation of distribution infrastructure and household energy meters. The project will utilise knowledge generated from the research under Modern Energy Cooking Services (MECS) programme on adoption behaviour and incorporate those in the behaviour change framework. The project will cooperate with NREP to strengthen access to financial services. EnDev will avail services and build synergies with AEPC's work particularly upcoming project under the Green Climate Fund (GCF) which will establish testing centres. EnDev will coordinate with AEPC, Nepal Academy of Science and Technology (NAST) and Renewable Energy Test Stations (RETS) to develop a list of quality e-cook stoves.

### **Leverage / spin off**

The project will demonstrate viability of e-cooking and will inform (rural) municipalities and province governments with evidences to plan budget for e-cooking expansion. EnDev will engage female health volunteers, members of agriculture cooperatives and forest users groups to leverage their resources on behavioural change and demand creation. Other entrepreneurs willing to work with municipalities and province government will be able to utilise behavioral change framework, and appliance catalogue developed under this project. EnDev's work will generate a minimum leverage of 1:1 through financing from households, municipalities, local financial institutes and private sectors.

## Nexuses

EnDev aims to facilitate linkage with programmes on livelihoods and industry associations for private sector business growth. Further, the project will influence Ministry of Women, Children and Senior Citizen with the business case on agency building. EnDev will also work in nexus with Women Network in Energy and Environment (WONEE), community forest, health programs for leveraging resources and advocacy at local level.

### 1.14.5 Modalities

#### Electricity

##### Grid Extension

Since 2008, the EnDev grid extension RF provides accessible financing to rural communities, which seek access to the National Electricity Grid. This fund complements the support given by the Government of Nepal through the Community Rural Electrification Programme (CREP), that was initiated in 2002 by the Nepalese Electricity Authority (NEA). Communities that request support from CREP are requested to cover 10% of the total grid extension costs by own means. EnDev's RF offers a credit to cover 50% of this community equity cost. EnDev Nepal will continue assisting CREEs via this RF while NEA transferred the mandate for the management of the fund to NACEUN from 2020 onwards to serve eligible member CREEs with the needed financing support.

In addition, EnDev Nepal will make use of the opportunity offered by the decentralisation process ongoing in Nepal: After announcing a new constitution, Nepal is undergoing a federalisation process since April 2017, allocating more power to LGUs. Consequently, the community rural electrification by-law has been amended, and since 2019 municipalities are eligible to function as micro-utilities and take part in the CREP. Electrification is prioritized by most of LGUs and the community-electrification-by-law now also allows LGUs to act as micro distribution utilities. EnDev will assist LGUs to provide modern forms of energy to the population through a result-based financing approach. Major activities foreseen under this component are: (i) Technical assistance to existing revolving fund and coordinate with NACEUN and NEA to increase the number of project sites supported under the RF, (ii) select 2 LGUs in Karnali and Sudur Paschim provinces to assist Municipal utilities to perform their new mandate and (iii) select potential CREEs and mini hydro for the result based densification program and enter into agreement.

For the **densification subcomponent**, EnDev Nepal will continue the result-based financing approach initiated in 2017 to provide electricity access to an average 8 % of poor households in CREE areas that cannot afford the connection cost. Against prove of new connection for the targeted poor households, EnDev will cover around 50% of HHs connection costs for CREEs while the remaining share will be borne by HHs themselves.

##### Mini and Micro Hydro Projects

AEPC has promoted the use of renewable energy technologies to meet the energy needs of Nepal for decades. Among several programs under AEPC, the Rural Energy Development

Programme (REDP) funded by UNDP/World Bank and the Energy Sector Assistance Programme (ESAP) funded by DANIDA, NORAD, FCDO, and KfW/Germany from 2007-2012 focused on implementing MHPs in rural Nepal. Upon the successful completion of the REDP project in April 2011 RERL (Renewable Energy for Rural Livelihood) has been initiated. In 2012, the National Rural and Renewable Energy Programme (NRREP) a multi donor funded programme supported by the GoN and a consortium of development partners was initiated under AEPC's umbrella. Thereafter, the Community Electrification Sub-component (CESC) under NRREP started supporting developing micro/mini hydro projects in distant areas. All these programs provide subsidies for MHPs which cover in average 45% of the total project costs. The project developer, either a local community or a private developer, consequently, faces high upfront cost to cover the remaining costs for MHP development. Including equity and subsidy there is still a funding gap of approximately 30% of total costs. In particular poor and remote communities (that face high transport costs) fail in providing sufficient own resources.

EnDev will continue to assist communities in remote areas by providing financing and technical assistance to the MHDF that is managed by AEPC jointly with the involvement of partner banks. The MHDF complements the listed Government support programmes. The approach is chosen to assist MHP utilities to overcome the barrier of access to finance, attract banks to invest into the sector and develop a risk insurance system. The major activities are, (i) Coordinate with AEPC and partner banks to increase the support to MHP, (ii) Identify MHPs to be assisted, (iii) TA to AEPC, banks, LGUs and users for implementing selected MHP projects, (iv) monitoring and verification of MHP projects and (v) elaborate phase-out concept for EnDev assistance for the MHDF.

With already high electrification rates (more than 90 %) and planned further extension of the grid, scaling up potential in the off-grid electricity sector is mostly limited to very isolated areas. The fact that currently only about 35% of the total amount of the MHDF is used underlines this hypothesis. Support to render micro-hydro power installations more sustainably including grid connectivity is a key topic for coming years and has potential for additional energy access for productive use. Due to its long experience in the MHP sector and successfully implemented pilots in grid-connecting MHPs, EnDev can be a key partner to develop an enabling environment for the transition from off-grid MHPs to grid-connected MHPs. In consultation with AEPC and EnDev HQ, options for including grid-connecting activities within the existing MHDF will be considered.

### **PicoHydro**

In remote communities in the high hills of Sudur Paschim and Karnali Provinces where connection neither to the national grid nor to the MHP is feasible, pico hydro schemes will be introduced to provide electricity along with mostly existing mechanised agro-processing facilities.

SNV Nepal will collaborate with (rural) municipalities and qualified consulting firms for the implementation of the project. LGUs and pico-hydro user committees (UCs) will be the major local stakeholders. SNV Nepal will provide the advisory, technical and management support and will also undertake field level activities related to identification of project sites, collaboration with LGUs and user committees, installation of the project, capacity building activities,

etc. GIZ will monitor and evaluate the installation and provide 25% of the total costs as grant. AEPC will provide policy support and subsidies.

## Cooking

### ICS

In the Cooking component, a RBF project for improved cooking is currently implemented and will end at the end of 2021. The project provides awareness raising, technical assistance for the range of stakeholders, capacity building for the main public sector actors, and general stakeholder co-ordination.

- The RBF incentive scheme bases on experiences gained by Practical Action and SNV in Nepal and is structured along several factors including stove performance, warranty, and remoteness of the intervention area. The incentives are provided to the private sector including providers of stoves for last mile distribution, local financial institutes, and may also include discount incentives for higher tier stoves. Incentives will be made available to private sector companies after sales are successfully verified, using a digital tool.
- Behavioral change campaigns are organised on large scale in the intervention areas including distribution of printed materials, socialization meetings and radio broadcasting.
- Technical assistance is provided to the private sector (i.e. market intelligence and business plan development), rural/ municipalities (i.e. engagement in planning, promotion, financing and monitoring), and local financial institutions (i.e. credit provision to customers and providers).
- Energy Committees and Energy Units established in rural/municipalities are capacitated on technology, quality of monitoring, awareness campaigns and monitoring.
- Linkages are established among the financial institutions, customers, service providers and local government.

### E-cooking

EnDev will initiate a RBF pilot expansion project for e-cooking appliances. EnDev propose RBF to kick-start the market. A Participatory Market System Development<sup>61</sup> (PMSD) will be adopted, a market systems development approach, based on the principles of systems thinking, facilitation and participation, developed by Practical Action. The PMSD has been proven to be particularly successful in creating win-win situations and sustainable changes for the market actors utilising available budget and resources effectively and efficiently during the project lifetime. The PMSD will also support the empowerment of women and marginalised households, engage private sectors, and create an enabling environment for change. Based on the results of a market potential study conducted by Practical Action, EnDev will work with CREEs in Bagmati and Gandaki<sup>62</sup> to demonstrate viability of e-cooking.

National Association of Community Electricity Users-Nepal (NACEUN) will be one implementing partner. NACEUN is a national federation of Community Rural Electricity Entities (CREEs) that provides services on institutional strengthening and supports capacity development and business development of its member CREEs. NACEUN will execute social

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<sup>61</sup> <https://www.pmsdroadmap.org/>

<sup>62</sup> There are 1.27 million households in Bagmati, 0.58 million in Gandaki; 90% electrified and distribution infrastructure upgradation ongoing

mobilization and demand creation. EnDev will conduct progress tracking, monitoring and verification of results; develop behavioral change framework, execute trainings to last mile distributors and link them with GDC.

**Following activities are planned:**

**Raising demand** – EnDev will implement a Behaviour Change Campaign (BCC) in combination with 20 % discounts on e-cooking appliances, based on previous success in Nepal, Kenya and Rwanda. Linkages with local financial institutions and possibly through EnDev supported Revolving Fund to access credits for remaining 80 % will be facilitated. Moreover, EnDev will closely work with local governments and community-based organisations (e.g., local mothers' group, female community health volunteers, local financial institutions) to stimulate demand.

**Gender transformation** - Based on learning and experiences, EnDev will deliver agency-based empowerment so that women will be able to decide independently on what appliances they want to buy. EnDev will carry out targeted awareness and behavioural change activities to understand womens' need and involve them in decision making.

**Increasing reliable supply** – EnDev will assist e-cooking appliance distributors and retailers for their business growth through demand estimation, marketing strategies, business plan development and financing, and establishing repair service provisions at local level. The support will target particularly at women entrepreneurs and those who may be adversely affected by a move to e-cooking. EnDev will build links between last mile distributors and retailers and appliance manufacturers and importers. EnDev will streamline the shift to e-cooking through a digital information and business platform. This will enable smaller local companies to aggregate orders so that they can achieve economies of scale and provide competitive appliance prices for customers.

**Fostering an Enabling Environment**

EnDev will build the capacity of CREEs to conduct safety audits, and generate evidence following a study on cost benefits of investment on distribution infrastructure. CREEs will also be assisted to develop business plans and incentive strategies for increasing revenue generation. EnDev will gather evidences and advocate for fiscal measures and policy changes such as subsidy reforms at three tiers of government, tax incentives and implementation of a Nepal Energy Efficiency Action Plan, e-cooking standards, and e-cooking market growth in the long run. EnDev will support a multi-stakeholder platform for synergy, information exchange, policy dialogue and advocacy.

## 1.14.6 Results

Project results		Reached targets 12/2020	Absolute Targets	Additional targets
People: Access to Electricity	Access to grid electricity to 11,000 new HHs through CREEs and LGUs and electricity access to 6,350 new HHs through development of micro and pico hydro.	320,416	386,000	65,584
People: Access to Cooking	Access to improved cooking to 7,500 new HHs through developing the capacity of the private sector, local government units and financial institutions.	123,707	145,000	21,293
SI: Access to Electricity	Electricity access to 200 Social institutions	1,608	1,770	200
PU: Access to Electricity	1200 Electricity based micro enterprises	3,849	6,150	2,300

### Electricity

The proposed activities will provide additional electrification to 65,584 people, 2,300 SMEs and 200 SIs. This implies that supported beneficiaries will have easy and affordable access to electricity in order to light their houses, and to use the available electricity for economic activities to improve livelihoods and increase incomes. Beneficiaries have access to improved health facilities due to availability of health equipment and to quality education with introduction of ICTs etc.

Along with the electricity facility, further support is proposed to LGUs, as well as CREEs. The electrification through densification will contribute to the social justice by providing electricity to all, following the principle of leave no one behind. For off-grid, the MHDF will be redesigned including grid-connecting of existing projects and demonstrate a favourable environment for banks to invest into a rural electrification project. Pico-hydro systems along with electricity will also provide mechanised agro-processing facilities for remote communities.

### Cooking

The project will make important contributions to the further development of the sector for market-based dissemination of improved cooking solutions, addressing demand, supply and enabling environment in an integrated manner. The main benefits for the households are increased stove efficiency and reduced indoor air pollution, resulting in firewood savings, reduced time in firewood collection and cooking, and improved health.

### ICS

In case of cooking with ICS additional 19,143 people will have access to improved cooking technologies by the end of 2021. The proposed work on improved cooking will result in an ICS market development, improved health, reduce drudgery of women, contribute for their livelihood improvement and protect the environment and forests. A post-evaluation of the ongoing project will contribute to share learnings of the RBF approach.

## **E-cooking**

10,000 HHs and 100 enterprises will have access to e-cooking technologies. The proposed work will result in e-cooking market development, improved health, reduce drudgery of women, contribute for their livelihood improvement and protect the environment and forests. Enabling environment will be created for at least 10 last mile distributors (supplier, distributor, retailer etc.) for entering the market. At least 10 local financial institutions will establish loan product for electric cooking appliances and start providing it, out of which 50 percent will women led cooperatives. Learnings of this intervention will contribute to leverage and accelerate planned interventions of ESMAP and GCF.

## **Targeted SMEs and SI**

Small businesses like cold stores, hotels, poultry farming, carpentry, tailoring etc. are major beneficiaries of electrification projects (see table at the end of the proposal). Additionally, high power consuming enterprises such as hullers, grinders, oil expellers, communication base transmission station systems, irrigation and drinking water projects, metal grill factories etc. are clients of MHP and grid electricity. Specific to grid electrification are large enterprises which have electricity power rating up to 50 kVA (kilo Volts Ampere) like manufacturing and processing industries.

As of social infrastructure, schools, colleges, health facilities, temples, LGU offices, street lights, cooperatives etc benefit from electricity facilities.

## **Enabling environment**

EnDev in Nepal had a strong role in the sector with respect to creating the environment to shift away from fully subsidised interventions towards providing credits at market provision. After EnDev provided the evidence in Nepal, that revolving fund mechanisms do work, the donor community replicated this approach. EnDev set an example through the MHDF, which led to the creation of the multi donor CREF in Nepal.

Similarly, EnDev in Nepal implemented a RBF ICS facility and created the environment for the RERA program to also establish a RBF based RF in the country.

EnDev in cooperation with the CCA will now test the ground for pilot promotion of electric induction cookers in rural Nepal.

## **1.14.7 Sustainability**

### **Electricity**

**Grid extension and densification:** The stability and reliability of the grid improved substantially during the past years. However, in order to improve the financial sustainability of CREEs, it is foreseen to support densification of grid connections. Densification in principle increases the economic sustainability of CREEs in the medium term since with an increasing number of customers, more revenue can be generated. It has been observed that energy consumption by supported households rises, along with gradual increase in use of electrical appliances.

The sustainability of the revolving fund is to be ensured through the transfer of the RF to existing and reliable entities in Nepal. The grid extension RF used to be managed by NEA in



the past but NACUEN has formerly been commissioned with this task in 2020. NACEUN's mandate is to lobby for the interest of CREEs, hence, NACEUN coordinates with NEA concerning technical and policy issues. NACEUN has also already managed the RF in the past, however without a formal mandate from NEA to safeguard the fund. Based on earlier experience, it is to be expected, that NACEUN will be able to motivate CREEs to repay their loans which is crucial for the effectiveness of the fund. Some CREEs need further assistance to elaborate valid business plans.

EnDev also supports the RF by developing and testing of a cloud-based utility software. Experiences has shown that managing these CREEs is a tedious task with the current ledger system. Issues like lost record, transaction histories, fund mismanagement and transparency arise due to paper based record keeping system. When it comes to smooth operation of CREEs timely tariff collection is one of the important aspects making the plant sustainable in the long run. The scattered households, unavailability of the house owner at the time of tariff collection delays the tariff collection. With present setup payments are made at CREE offices generally located in market areas, but to make a payment of few hundred beneficiaries must travel longer distance with additional financial burden. These issues prevailing can be changed with the introduction of a digital solution which can be used both as a utility billing system and a database system to store all data related to customer, their energy demand/consumption records, payments, statements, contacts etc. In the meantime, this solution should also be able to keep track of CREE internal records i.e. Time of Day (ToD) meter readings, NEA billing records, outage/ maintenance records, transformer load factor and other parameters.

**MHP:** Institutionally the MHDF is set up with AEPC and involvement of banks thus is in principle running for its own. Sustainability of MHDF depends on the payback rate from the supported utilities. So far, the repayment is 60%. EnDev jointly with its partners advises and assists MHPs user committees to elaborate and implement valid business plans and to enable a regular tariff collection. MHPs are verified by AEPC for compliance to national standards. A phase out strategy will be developed that capacitates partners to take over monitoring and follow up tasks EnDev is currently still conducting.

EnDev is also piloting the installation of Advanced Metering Infrastructure (AMI) in one MHP. Results and impacts of this pilot will help to formulate recommendation for a remote management of MHPs and will be shared with AEPC. AMI contributes to sustainability of MHPs because from the past experiences in MHDF there have been several challenges in terms of sustainability of MHPs with one major factor repeated that is lack of revenue for meeting basic operation cost of MHPs. Lack of transportation and difficult geographical terrain (isolated/scattered settlements) makes it challenging for the management to reach out to the electricity consumers and vice versa for tariff collection. With AMIs, the tariff collection is more efficient and convenient to both users and management as this timely tariff collection aids in repayment of the loan on time, meeting daily operation costs as well as reduced human resource required to go door to door for tariff collection (sometimes 1.5 days walk) leads to increased savings for repair/maintenance fund of MHP. Furthermore, users are more aware of the rules and regulation regarding tariff payment/penalty and their own electricity consumption. Finally, the MHP user committee are enabled to practice good management systems in terms of accounting, book keeping/record keeping.

To render micro-hydro power installations more sustainably including grid connectivity is a key topic for coming years. Grid integrated MHPs will mainly be sustainable and maintained by the local MHP user committee and NEA according to their agreement. Once connected, these MHPs will no longer depend on projects as they will have the financial means to take care of operation & maintenance. EnDev is a key partner for AEPC to develop an enabling environment for the transition from off-grid MHPs to grid-connected MHPs.

**Pico-hydro:** Sustainability of pico hydro sites will be ensured by project support to municipalities. By providing capacity building municipalities will be capacitated to ensure the service delivery of pico-hydro power, both for existing and new schemes. The schemes installed under this project will be handed over to rural municipalities and/or user committees in the remote communities. Almost all electromechanical components of the schemes will be manufactured in Nepal. After successful implementation of sites under this programme, suppliers are expected to further develop their business in other remote communities on their own.

## Cooking

**ICS:** The project will promote a self-sustained market-based mechanism for the promotion of improved cooking technologies to ensure the economic sustainability of the results. Key barriers in both demand and supply side will be removed in the intervention areas. Technical sustainability will be ensured by developing the supply chain structure as well as repair and maintenance capacities of the suppliers. For institutional sustainability, municipalities will be capacitated to create and sustain an enabling environment for improved cooking. Through this, they will continue stakeholder facilitation and market regulation after the project end. The municipalities, in cooperation with local financial institutions will also progress the financial sustainability of the supply chain. Awareness raising and consumer awareness through behaviour change campaign will contribute to the achievement of social sustainability. Most of the products will be manufactured or assembled in Nepal; no issues are expected when it comes to social sustainability. The project will also support and lobby together with stakeholders for coherent policies to develop and promote improved cooking technologies.

**E-cooking:** The project will address market system barriers of e-cooking. By the end of the project, there will be strong supply chain of e-cooking appliances backed by adequate support services and favourable policies. EnDev will ensure technological sustainability by establishing local repair centres and warranty service provisions by the suppliers. The project will ensure standards of e-cook stoves through qualifying products, complying standards and producing a catalogue of standard appliances. For institutional sustainability, evidences will be documented and disseminated to municipalities to help them develop e-cooking programmes and allocate budget. The CSOs will come together in a multi-stakeholder platform to advocate and lobby for reliable electricity and equitable tariff to encourage electricity use for cooking. The CSOs through multi-stakeholder platform will continue stakeholder facilitation and market regulation for e-cooking after the project end. For ecological sustainability, EnDev will coordinate and leverage the potential with youth led start-ups of e-waste management. One of the key advocacy agendas of multi-stakeholder forum will be on waste management of e-cooking appliances. Further, the shift to e-cooking will reduce the greenhouse gas emission and reduce environmental footprints through digital business platform

and web-based monitoring. The financial sustainability will be ensured through increased investments from public sectors, mainly from local governments, private sectors and financial institutions. Moreover, strengthened business capacity of CREEs will ensure sustained growth of e-cooking. EnDev will ensure social sustainability through increased knowledge and capacity of CBOs (e.g., CREEs, mothers' group, community forest user group) and agency building of women which will create continuous demand of e-cooking.

The exit strategy will be considered from the beginning of the project. Taking the Participatory Market System Development approach EnDev will facilitate market actors to build their linkages with each other for the business expansion of e-cooking and gradually reduce support to the process and stop by the end of the project, then EnDev expect that, these processes will run independently. Based on experience on RBF, distributors and retailers will be support to be more independent by the end of the project. Repair and after sale service provision will continue to offer services after the project. EnDev will build knowledge and capacity of households and CBOs for e-cooking adoption, and the demand will continue to grow after the project. The project will work with all tiers of government to ensure their ownership and with local government for increased investments and programmes on e-cooking. By the end of the project, EnDev will complete piloting of a digital business platform which will enable smaller local companies to aggregate orders and achieve economies of scale. To maximize impact, and underpin sustainability, EnDev will align the interventions and leverage synergy and cooperation with other programmes of AEPC, FCDO, World Bank and CCA from the very beginning of the project implementation.

### **1.14.8 Gender Strategy and Safeguards**

#### **Electricity**

At the national level different policies and strategies are formulated in promoting the participation of women/marginalized community in meeting the energy needs and enhancing their decision-making skills. However, the findings from the gender analysis reflect that at the grassroots level women/marginalized community are just the beneficiaries for utilizing the energy services. To enhance the involvement of women/marginalized community in energy management, it still requires awareness/sensitization, capacity enhancement/skills training-electrical safety training as well as operational and technical trainings, followed by adequate legal provisions within the system. Productive Use Enterprise (PU) activities are low in low economic strata, marginalized/disadvantaged, disaster affected/displaced population in electrified area. The key approach of the project is to enhance energy-related income-generating activities for women/marginalized community's entrepreneurship for their economic empowerment and capitalize their employment opportunities. Also, the project will apply gender-inclusive participation strategy in all stages of project design, development, and implementation.

In the initial stage of project design, national level sensitization workshop/consultation meeting with the policy makers will be organized to discuss on the existing GESI specific policies/action plans on clean and renewable energy along with its delivery mechanism, processes and measures to ensure its implementation. Followed by a sensitization workshop at the local level with the supplier/consumers of CREES/Micro & Mini Hydro projects to orient on the relevant GESI policies as well to assess the energy situation at the grassroots level. Appropriate gender analytic tools will be used to assess the problems and potential risks of

unintended harm and to identify activities for implementation. The project activities will focus on income generating activities on the productive use of electricity with motivational scheme for women (subsidised tariff, seed money, technology support, zero interest etc) for enterprise development linking them with market, financial services (MFI, cooperatives or Bank) as well as small and cottage industries.

### Cooking

Women are foreseen to play a key role in promotion and sustainable adoption of ICS and e-cooking because women spend most of their time cooking for males due to the prevalent gender roles. With EnDev Nepal's vision to progressively venture into higher tier improved cooking solutions, women will benefit directly from reduced cooking time and drudgery which can enable them to take up capacity building activities or engage in other income generating activities. There are benefits achieved by the promotion of clean cooking solutions as women's cooking time, exposure to indoor air pollution/ health hazards are reduced with clean cooking solutions.


EnDev's experiences have shown that working with both men and women not only improve household dynamics but also support women to engage in earning activities, access resources such as credit and put their voice in community, market and policy forums. In every aspect of the project cycle - from planning to evaluation - a thorough integration of gender transformative approach (e.g. women empowerment, men's engagement in changing behaviors and social-cultural constraints, etc.) will be ensured. It has been explicit that physical drudgery is taking a huge toll on women's health and also affecting their ability to engage in earning, learning and social activities. EnDev will deliberately focus on reducing the drudgery and improving the health of women through building awareness, knowledge and capability to understand the benefits of ICS and e-cooking, thereby helping in adoption. Beyond households, EnDev will engage women in stove supply chain and also develop them as change agents for stove promotion and sustained use. EnDev will link women with credit access, value chain services and market linkages.

### General

EnDev will ensure safeguarding against any form of exploitation and abuse to the project participants, community members, staff, volunteers or anyone else impacted by our work. EnDev will ensure any capacity building or training events will be suitable to women's time availability and places/venues. The project will take targeted approach for the most marginalised for their meaningful participation in the project and ensure that no one is left behind. EnDev will develop monitoring, evaluation and learning framework including appropriate sex disaggregated and gender sensitive indicators to strengthen accountability in terms of the progress and identify gaps that need to be addressed.

# 1.15 Rwanda

## 1.15.1 Summary and key data

<p><b>Promoted technologies</b></p>  <p><b>Summary of proposed interventions(s)</b></p>	<p><b>Mini-grid results-based financing (RBF) and productive use of energy (PUE):</b> The component will accelerate electricity access through solar mini-grids by 1) facilitating <b>access to finance</b> (RBF), 2) providing <b>business development support</b> for PUE, 3) <b>policy advice</b> to government, and 4) <b>capacity building</b> for developers. EnDev will <b>partner</b> with the Rwandan Development Bank and the Belgian Development Agency to ensure project feasibility and access to pre-commissioning financing.</p> <p><b>Private sector participation in hydropower for rural development (PSP hydro):</b> Running since 2006, PSP Hydro is being phased out, as on-grid power production – including private production – has increased significantly in recent years. The three ongoing projects supported by EnDev through <b>capacity building</b> and <b>access to finance</b> will be completed in this phase.</p> <p><b>Reducing climate impact of cooking in Rwanda through improved cooking systems (RECIC):</b> This new component is funded through the European Union’s Global Climate Change Alliance Plus initiative and will run until 2025. Interventions include <b>capacity building</b> focussing on business development and technical skills incl. quality control and R&amp;D, performance-based <b>incentives</b> and <b>awareness-raising</b>. The goal is to establish sustainable demand and supply of improved stoves and fuels to benefit more than 200,000 people until 2024.</p> <p>By June 2021, the <b>pico PV Pro Poor RBF</b> will be phased out, while <b>Burundi (cooking)</b> will be decoupled from Rwanda. Results for both components are included in the targets, but the components are not described further.</p>		
	<p><b>Quantitative targets [# of]</b></p>		<p><b>Further relevant impacts/outcomes</b></p>
<p><b>Energy for lighting / electrical appliances in households</b></p>	<p>25,445</p>	<p>People</p>	<p><i>Of which 4,431 among most vulnerable groups</i></p>
<p><b>Cooking / thermal energy for households</b></p>	<p>38,413</p>	<p>People</p>	<p><i>Of which the majority will be among the rural poor</i></p>
<p><b>Electricity and/or cooking / thermal energy for social infrastructure</b></p>	<p>16</p>	<p>SI</p>	<p><i>Some of which will consist of health centres</i></p>
<p><b>Energy for productive use / income generation</b></p>	<p>128</p>	<p>MSMEs</p>	<p><i>Business development support to 60 businesses (min. 20 female ownership) at mini-grid sites</i></p>
<p><b>Project period</b></p>	<p>01.01.2021 – 31.12.2024</p>	<p><b>Indicative Budget</b></p>	<p>EUR 8,828,992<sup>63</sup></p>

<sup>63</sup> Of which: (1) Core funding EUR 4,646,679; (2) ReCIC EUR 4,000,000; (3) USAID EUR 182,313

## 1.15.2 Theory of change (ToC) and state of market

### Electricity sector

The Government of Rwanda (GoR) aims to achieve universal access to electricity by 2024. The Energy Sector Strategy Plan (ESSP) for 2017–2024 sets out that 52% of the population should be serviced by the grid, while 48% will receive off-grid electricity access. Which areas will be connected to the grid or will rely on solar home systems (SHS) and mini-grids, is demarcated by the National Electrification Plan (NEP). To achieve its off-grid electrification targets, the GoR is seeking to partner with the private sector (Rural Electrification Strategy 2016). In doing so the GoR hopes to accelerate cost reduction and improve customer choice, while compensating for limited public funding and capacity.

To date, 41% of households have access to grid electricity and only 15% are using off-grid energy services. Off-grid electrification, particularly for mini-grids, has not advanced at the desired pace due to a range of barriers, including (1) lack of appropriate financial support for companies to ensure viability, (2) lack of demand due to limited capacity to pay of end-users and a lack of productive use, (3) some remaining uncertainty in legal and regulatory framework conditions, (4) insufficient access to funding for companies.

EnDev will focus its new activities on the mini-grid sector as the World Bank-funded Renewable Energy Fund (REF) will be scaling up EnDev's Pro Poor RBF concept, which address the most pressing challenge in the pico PV area – affordability. In the mini-grid sector, EnDev will address all of the above-mentioned barriers, through the provision of viability gap funding, the promotion of PUE, collaboration with (financial) partners, and policy advice.

	Energising lives			Energising opportunities			Energising climate			
Impacts	Access to modern energy services and savings generated	Health Improved access to modern health services and reduced health impacts from exposure to kerosene	Education Improved education conditions (both at home and at school) with greater access to information (e.g. via radio, mobile phone, computer, etc.)	Rural economic development Job creation and improved income generation due to new economic activities and greater productivity	Resource mobilisation & leverage Financial leverage at rural level through investments in rural enterprises	Resource mobilisation and leverage Greater investment in mini-grid sector by banks as equity investors	Low carbon development Low carbon development strategies adopted and implemented	Emissions Reduced CO2 emissions		
Assumptions	Private sector and public actors continue investing to expand the provision of modern energy services and products Households businesses and social institutions continue to use, replace and properly dispose of modern energy services and products.							Productive use continues to be actively promoted and supported at mini-grid sites	A conducive, transparent regulatory and legal environment that facilitates market development in the MG market	
Outcome	Mini-grid developers are able to develop and implement bankable projects		Mini-grid viability improves due to lower financing costs	Banks increasingly offer commercial loan products for mini-grid developers at acceptable conditions		Companies are able to develop and implement more mini-grid projects	Electricity demand increases and mini-grid viability is improved		The enabling environment for mini-grids has strengthened	
Assumptions	Companies have acquired and can transfer skills to other projects		Companies develop viable proposals, raise sufficient equity and receive local debt	Banks gain more experience in assessing sector risk	Banks make use of available loan guarantees	Companies access subsidies to meet gap funding needs	Rural enterprises are launched and can be sustained in the long-term		CoR takes on advice resulting in greater buy-in and the improvement of the enabling environment	
Outcomes and results	Technically and financially viable project proposals developed with EnDev's support	Feasibility studies jointly developed with developers	Loan applications developed with the help of Enabel	Local currencies loans available to mini-grid developers at more favourable terms		Guarantees for mini-grid loans are available	Grant funding available to support the development of viable mini-grids with affordable tariffs	Rural entrepreneurs are trained in business development (productive use)	Rural entrepreneurs receive financial support to purchase necessary equipment for business activities	Active participation in consultations, dialogues, etc. with private sector, government, DP's and other partners
Intervention	Provision of TA to developers to support the development of viable mini-grid projects	Enabel's Private Sector Participation in the Generation and Distribution of Electricity from Renewable Sources (PSPG) programme		REF Window 3 direct local lending to MG developers (WB funded)		Loan guarantees for REF Window 3 (USAID & SIDA)	RBF for mini-grids	TA and grants for the development of productive use activities at selected mini-grid sites		Sector engagement and advocacy toward a conducive mini-grid enabling environment
Barriers	Supply side barrier Private developers do not have access to necessary support to develop skills			Enabling environment barriers Lack of access to affordable local finance because mini-grids perceived as too risky			Demand side barriers Insufficient economic activity / productive uses Limited disposable income of (potential) HH clients		Enabling environment barriers Policy uncertainty and delays in the adoption of relevant documents (e.g. national electrification plan)	
Assumptions	Private developers lack capacity to develop economically viable mini-grid project proposals			Investment cost too high			Too little demand to ensure financial viability		Without policy certainty (e.g. regarding grid arrival) the financial viability of projects is endangered	
Root cause	Mini-grids are not being developed in sufficient quantity.									
Core sub-sector problem	<p style="text-align: center;"><b>MINI-GRID</b></p> <p>Only 15% of HH have access to electricity through off-grid technologies (target: 48%). To date, only 12 mini-grids are operational (target: 2000 by 2024)</p>									
Core sector problem	56 % of HH do not have access to sustainable / renewable, reliable, affordable electricity (SDG 7.1, SDG 7.2).									



## Cooking energy sector

According to World Bank, nearly 70% of the population in Rwanda continues to use three-stones and traditional stoves for cooking. Moreover, Rwanda's Biomass Energy Strategy (BEST) set as the main target for the biomass energy subsector to reduce the percentage of households that use inefficient cooking solutions from the baseline value of 83.3% recorded in 2014 to 42% by 2024. Still, no significant improvement has been achieved as the GoR report from December 2020 indicated that household dependency on firewood stands at 97%. Current barriers that prevent substantial change in sector are linked to following root problems: 1) the ICS industry continues to be at nascent stage; 2) low awareness on ICS and its benefits, efficient fuels and adequate cooking techniques; 3) the biomass sector is an orphan topic amid GoR institutions.

In order, to contribute towards the achievement of the BEST strategy by 2024, EnDev through the EU co-funded ReCIC project plans to implement a market-based approach to overcome barriers in the supply and demand side of the ICS markets as well as the enabling environment in the biomass sector. However, the socioeconomic impacts of COVID-19 and the scale-up free stoves distributions coupled with GOR's continuous preference for higher tier and more expensive technologies may prevent EnDev from contributing towards the consolidation of an ICS market in Rwanda.

Theory of Change - EnDev Rwanda (Cooking energy - ICS)			
<b>Impacts</b>	<b>Economic development</b> A vibrant and functional of affordable ICS is in place Increased job creation Strengthened rural economic activity Increased resource mobilization	<b>Social development</b> Improved HH income situation and vulnerability Improved Household health and vulnerability to respiratory diseases Improved know-how of ICS and fuels producers	<b>Combating climate change</b> Significant CO2 emissions from household cooking is reduced Pressure on Rwanda's forest coverage is reduced
<b>Assumptions</b>	ICS and cooking fuels market is functional	Long-term adoption of ICS and complete dismissal of three-stones	Biomass sector becomes a relevant topic for all stakeholders involved
<b>Outcome</b>	<b>Consolidated businesses in the ICS and fuels sector</b> <b>Increased availability of different ICS types (HH &amp; PU) and alternative fuels</b> <b>Distribution network in rural and urban areas in place</b>	<b>Reduced usage of solid biomass</b> <b>Reasonable access to finance for ICS (producers and consumers)</b>	<b>An enabling regulatory environment and labelling system are in place</b> Presence of multiple actors carrying-out activities in ICS and clean cooking increased Testing stoves becomes accessible for producers
<b>Assumptions</b>	Producers will invest profits and loans to increase production and business More retailers lead to higher sales Stoves options and fuels options increased Access to finance leads to higher ICS sales	Rwandans will look for ICS and improved fuels Rwandans will recognized branding and labels for ICS and fuels Increased awareness of ICS and alternative fuels leads to higher sales Consumers and producers can pay back loans	Charcoal tax is enforced Tax exemptions contributes to make local production more competitive Biomass sector coordination thrives
<b>Outputs and results</b>	ICS producers can carbon credits schemes, subsidies and loans Producers increased production and have higher benefits and superior brand recognition ICS producers are well informed and are able to take advantage of market trends Network of retailers established Availability of consistent market information through database Brand recognition for ICS and fuels in place	Consumers (HH, PU) can access loans or subsidies to purchase a ICS ICS are known by the population and local demand increased Increased demand for ICS and improved fuels Branding recognition of ICS	Testing lab personnel is equipped with skills and experience to continue testing stoves Coordination between stakeholders in biomass sector is achieved Stoves are tested categorized and recognized branded Stronger GoR and district support for ICS awareness, production and dissemination Tax exemption contributes to lower end-prices for ICS Stronger EPD support to ICS producers with advocacy and coordination
<b>Risks</b>	GoR's standards for ICS and fuels discourage or prohibit production and dissemination of intervention(s) stove(s) and alternative(s) fuel(s)	COVID-19 bans all social events and disrupt activities in the ICS sector	Scaled-up dissemination of free or highly subsidised stoves disrupt the market
<b>Key interventions</b>	RBF for +Tier 2 stoves and TA (WB) Carbon finance scheme development support and linkage to providers Capacity-building and equipment provision for fuels and ICS producers Pilots to introduce new technologies (e-cooking) and financial models (PAYGO) Incentive-based schemes to support businesses and get market information LPG Masterplan (ktW and GPLPG with MININFRA) MFIs or commercial banks offer loans for stoves or producers Develop Database of companies and ICS available in market Trainings/coaching on quality ICS production Capacity building of business and branding Support development of a distribution network	Awareness campaigns on ICS and charcoal ban Massive awareness campaigns (incl. theatre, TV, radio, demonstrations) Private sector led exhibitions and cooking demonstrations Massive awareness campaigns on LPG Development of an innovative PAYGO (especially for higher ICS tiers) ICS loan product development for beneficiaries to MFIs (especially for higher ICS tiers) and producers Conduct an ICS market study Private sector led targeted 'Recruitment' of retailers ToTs and advocacy towards districts Capacity building of EPD for ICS coordination and advocacy	Policy and intervention coordination between stakeholders Advocacy for ICS inputs and ICS tax exemption Policy and planning support towards central Government Set-up of new testing center Capacity-building of testing center personnel Set-up of quality control systems for locally produced ICS Charcoal ban in Kigali and secondary cities (GoR) Capacity building of EPD for ICS coordination and advocacy Facilitating testing processes, quality control and accredited labelling. Development of a labelling system for ICS and alternative fuels
<b>Barriers</b>	<b>Supply side barriers</b> Lack of sufficient and continuously tracked ICS market information Lack of financial access (incl. carbon credit) and own financial capacities to pay back in installments Inexistence of distribution network for both ICS and fuels Lack of technical, business and brand awareness capacities by producers No financial products or subsidies for ICS and fuels producers (e.g. carbon credits, loans, RBF) ICS transport challenges from production unit/urban warehouses Producers' current financial and organizational capacities prevents the from running wide-spread	<b>Demand side barriers</b> Lack of understanding on alternatives to traditional cookstoves Local demand remains low Free distribution decreases WTP Lack of ICS access (retails), mainly in rural areas	<b>Enabling environment barriers</b> Limited human capacities in testing lab Lack of coordination as sector is cross-sectoral and not a priority for any sectors Limited coordination between biomass sector and districts to determine targets (Imihigo) Regulatory environment not ready to facilitate a functional market for ICS Not all ICS components or fuels inputs are exempted from taxes Lack of a compulsory testing, quality control and recognition procedure EPD or any association is not engaged in promoting ICS or cooking energy agenda
<b>Assumptions</b>	Producers don't have enough financial capacities to scale-up production Low knowledge on carbon finance and lack of links to providers Limited capacity of producers to carry-out massive awareness raising campaigns An increase in ICS parts or transport cost will increase end-price Lack of retail hubs, mainly in rural areas nor critical mass of retailers Limited clean cooking activities at scale Limited availability of ICS (HH & PU) and alternative fuels options	Consumers do not understand health, social and economic benefits of ICS and improved fuels Consumers don't have enough financial means to buy ICS or higher tier stoves Lack of trust in ICS as result of past negative experience High and inefficient usage of solid biomass Low affordability and willingness to pay (WTP) No brand distinction	Existing standards are not exhaustive Lack of coordination with districts and GoRs to set complimenting targets Limited funds and staff members to assure continuity of operations in testing lab Limited GoR and districts' engagement in wide-spread awareness raising on ICS An increase in ICS parts or transport cost will increase end-price Testing center is not fully operational and quality control scheme is in place EPD unable or unwilling to coordinate or advocate ICS activities
<b>Root cause(s)</b>	ICS and fuels industry continues to be at a nascent stage	Low awareness of ICS and improved fuels	Biomass sector is an orphan sector
<b>Core problem</b>	Nearly 70% of households (HH) continue to use either a three-stone stove or traditional stove and inefficient cooking fuels		

## 1.15.3 Market Transformation

### Electricity sector

#### Mini-grid RBF & PUE

##### Market development

When EnDev's first mini-grid RBF was launched in 2014, no privately-owned mini-grids existed in Rwanda due to lack of financial viability. Risk-averse financial institutions were unwilling to lend to the sector. EnDev was able to improve the business case for several mini-grids, proving that they can be a valuable option for rural development. The team built capacity with developers and engaged with GoR, which led to a more conducive policy and regulatory framework. The REF's recent mini-grid lending window has improved prospects for pre-commissioning debt financing. But the market remains nascent with only twelve mini-grids operational, all of which required grant funding to reconcile business viability with affordable tariffs. Limited demand, access to local debt and policy uncertainty are still key challenges. Pilot projects are necessary to better understand the viability of different business models, identify financing opportunities and create investor confidence before the market can scale-up and be transformed.

EnDev will continue to address these challenges by (1) providing RBF financing to reduce the viability gap, (2) promoting PUE to increase demand and thus economic viability, (3) strengthening developers' skills, (4) collaborating with financial stakeholders to ensure pre-financing, and (5) working with government to ensure policy certainty and increase investor confidence (cf. section 6.1). EnDev was the first project to support mini-grid development in Rwanda and has become a leading partner in the sector as the only programme offering needed grants. While market transformation will depend on many factors and stakeholders, it is certain that it will significantly lose traction without EnDev's engagement. While grant support is not a long-term solution, it is necessary at this stage and can be phased-out once the market is able to competitively develop and operate mini-grids at scale.

##### Economic development

Mini-grids generally provide higher levels of service than other decentralised energy sources, enabling households and local entrepreneurs to use energy for productive activities and income generation beyond the project horizon. The planned interventions are site-specific and the result of an economic analysis and business plan identification. To date, EnDev has supported the electrification of tailors, shoemakers, carpenters, hair salons, welders, millers, small shops and local cinemas. New potential businesses to benefit from EnDev's support include milk collection centres (cold storage), poultry, bakeries and internet providers.

##### Social development

The component will also contribute to social development by electrifying schools, health centres and other institutions in mini-grid-supported villages.

#### PSP hydro

## Market development

EnDev has been supporting the development of small grid-connected hydro power projects since 2006. EnDev assisted in the development of the first three privately-owned hydro power plants through grants and technical assistance. EnDev has since supported four projects and strengthened the capacities of a number of developers. Thanks to EnDev's support, developers have acquired the competencies necessary to independently develop projects and have organised themselves in an association. Through its engagement with the GoR, EnDev has also raised awareness regarding the benefits of privately-owned projects and helped to set up the necessary enabling environment, which resulted in the GoR leasing a significant portion of small hydropower sites to private developers. As such, EnDev was a crucial catalyst for the market and has brought the market to maturity. EnDev will continue to provide technical support and grants to the remaining three projects (four sites) that were contracted previously and are awaiting completion before phasing out.

## Economic development

Electricity generated by supported power plants is supplied to the national grid. Therefore, these plants contribute to the provision of higher-tier electricity access to rural communities through the grid, which enables households and local entrepreneurs to use energy for productive activities and income generation.

## Social development

The component also contributes to social development through electricity access for schools, health centres and other institutions in rural areas. Social institutions will benefit from the higher-level service, which enables them to use larger, more energy intensive equipment, such as medical equipment in health centres and laboratories, workshops in technical schools, or audio-visual equipment for social meetings.

## Cooking energy sector

### ReCIC

#### Market and economic development

EnDev seeks to stimulate growth with manifold action on both sides of the market, i.e. **supply** (supporting producers for scale-up and innovation) and **demand** (encouraging end-users) and as well as **between the two** (facilitating distribution networks and **around the markets** (i.e. enabling environment) for improved stoves and fuels – cf. section 6 for details. Currently, the ICS market is predominantly informal, which prevents producers from achieving standardised production and hence ensuring good quality tier 1-2 stoves. Through RECIC, EnDev aims to consolidate some of the production units previously supported by SNV to boost local production while supporting new companies to validate their business models. EnDev will also seek to support economic development through **productive use** of improved cookstoves.

#### Social development

Through the wide-spread dissemination of ICS and alternative fuels as well as massive education campaigns on their proper usage, EnDev seeks to improve health through reduced indoor air pollution (IAP), affecting particularly women and children while cooking. Thanks to more efficient technologies leading to less biomass fuel requirements, women and children need less time for fuel provision leaving more time for social activities, education or work.

### **Poverty alleviation**

EnDev seeks to bring ICS to Rwandans in last-mile communities while promoting behavioural changes approaches (i.e. better cooking practices) that will increase fuel savings. This will represent an opportunity for poor Rwandans to save money for other basic needs and gain time for productive as well as social and educational activities.

## **1.15.4 Collaboration**

### **Electricity sector**

#### **Sector alignment**

EnDev's engagement in the electricity sector contributes directly to Rwanda's 2024 universal electrification target and off-grid electrification targets in the National Strategy for Transformation (NST 1), the ESSP and, its Nationally Determined Contribution (NDC) to the Paris Agreement. By focusing on sustainable market development, EnDev is also aligned with the RES, which emphasises the role of the private sector in achieving off-grid targets. All implementation is in line with national regulations, i.e. the NEP and the Simplified Electricity Licensing Framework for Rural Electrification.

EnDev's programs are also deeply embedded in Rwanda's institutional landscape. EnDev collaborates closely with the responsible line ministry, the Ministry for Infrastructure (MININFRA), the energy utility, the Rwandan Energy Group (REG) and the Rwanda Utility Regulatory Authority (RURA). EnDev engages with other government institutions as needed and maintains a continuous dialog with development partners. This allows EnDev to align its activities with sector and policy developments, to shape policy and to create synergies.

#### **Implementer base**

EnDev has built fruitful relationships with a range of government and non-governmental stakeholders over the past years. With its market-based approaches EnDev is seen as a catalyst for innovation in the off-grid sector. Government and donors also appreciate EnDev's expertise, which the programme has acquired through its close collaboration with the private sector. This implementation experience has allowed EnDev to provide valuable input for partners' policies and programmes, some of which consisted of leveraging EnDev pilots (e.g. private hydro projects, pico-PV scaling up – cf. above). Moving forward, EnDev seeks to capitalise on and deepen current collaborations in each component.

### **Mini-grid RBF & PUE**

Additional partnerships will be sought to overcome some of the challenges faced from 2014 to 2020. Key partners will include:

- **BRD**, who is administering the World Bank funded *Renewable Energy Fund* (REF) and the Swedish International Development Cooperation Agency's (SIDA) guarantee fund. The REF provides direct financing to mini-grid developers, complementing the RBF by providing pre-commissioning financing. The SIDA guarantee fund will facilitate access to REF loans for RBF beneficiaries by covering 50% of risk for male and 75% for female entrepreneurs. Both access to local currency financing and stringent lending conditions (e.g. high interest rates and 100% collateral requirements) were challenges in the past.
- The **Enabel / *Private Sector Participation in the Generation and Distribution of Electricity from Renewable Sources (PSPE)*** programme, offers technical assistance to developers, including feasibility studies for 20 mini-grid projects, assisting with (REF) loan applications and acquiring government permissions. EnDev will target projects from the Enabel pipeline.
- A **fund manager** may again be contracted to administer the RBF fund.
  - The utility, **EDCL**, will remain key partner for monitoring commissioning and ensuring the long-term sustainability of the sector. EDCL has been tasked with developing a concept for a mini-grid funding window. EnDev can support the conceptual development of this national window and use the revised RBF as a pilot to ensure a smooth transition and long-term market development.

### **PSP hydro**

Currently there are no other actors supporting on-grid privately developed small hydro power projects. In the implementation, EnDev will closely collaborate with REG and its two subsidiaries, EDCL and EUCL, as well as RDB, who leads contract negotiations with developers on behalf of the GoR.

### **Leverage**

The mini-grid RBF and PSP hydro will leverage commercial investments through private capital (for mini-grids min. 30% equity contribution, for PSP hydro projects between 5 and 50% equity contribution) and debt financing (through the REF and SIDA guarantee fund or other financial institutions). According to EPD, mini-grid developers have spent over EUR 8 million and are ready to commit EUR 29 million to the sector.

### **Nexus**

EnDev's activities in the electricity sector offer synergies with other sectors. The mini-grid RBF will contribute to rural economic development by supporting the productive use of energy (e.g. milling, tailoring, carpenters, welders, cold storage, etc.), which will foster rural entrepreneurship, job creation and skill development. In the PSP hydro component linkages with the water and land sector exist. To avoid water and land conflicts the components collaborates with local government and corresponding sector ministries. Additionally, both components will contribute to increasing the climate resilience of rural communities by.

### **Cooking energy sector**

## Sector alignment

EnDev's engagement in the cooking energy sector contributes to GoR targets. The national "Biomass Energy Strategy" (BEST) of 2019 aims at halving the percentage of households that use inefficient firewood technologies for cooking from the baseline value of 83.3% recorded in 2014 to 42% by 2024. The Nationally Determined Contribution (NDC) under the Paris Agreement for Rwanda set as unconditional contribution the dissemination of modern efficient cookstoves to 80% of the rural population and 50% of the urban population by 2030. EnDev also collaborates closely with the MININFRA and the REG in the cooking sector. EnDev engages with other government institutions as needed and maintains a continuous dialog with development partners.

Despite ambitious targets, little has happened in terms of transformative change. Major action, however, is expected shortly, as besides EnDev also the World Bank is launching a major programme (cf. below).

EnDev has continuously brought its cooking energy "philosophy" to the discussion of the BEST and sector dialogue with government and development partners. EnDev seeks to *maximise overall impact* by prioritising simple cookstoves over sophisticated ones that could not be disseminated in comparable quantities especially in rural areas. This advocacy has not been without effect on some of the major actors, who increasingly agree on the importance of affordability and a market-based approach and partly also take a cautious stance on LPG. Nonetheless, opposing views do persevere, as the government wants LPG to become a major part of the solution and some even hope to eliminate biomass altogether for cooking purposes. Common ground, however, is found in the highest-level goal, i.e. to bring into balance growth and usage of biomass, for which particularly inefficient charcoal must be reduced. The steering committee foreseen in ReCIC can provide a platform for better sector alignment (incl. coordination with other sectors – cf. 5.2.4)

## Implementer base

- The **World Bank** is setting up a USD 10 million clean cooking window to subsidise purchases of clean and efficient cooking solutions by eligible households through RBF. EnDev has initiated collaboration with WB to support local producers to enrol in the scheme and improve their capacities where needed. However, given that the ICS market remains mostly informal, the majority of supported workshops supported through the current SNV intervention do not meet the eligibility criteria. ReCIC will support producers to reach formality and scale-up.
- **Rwanda Standards Board** (RSB) set up a testing centre for cookstoves with financial support of the WB and the Nordic Development Fund (NDF) and technical support of Aprovecho Research Center. While the testing centre is well equipped, there is need for staffing and capacity building, for which EnDev seeks to collaborate with WB and RSB.
- Other prospective partners include:
  - The **Rwanda Green Fund** (FONERWA) programme to combat deforestation
  - The **Global LPG Partnership** and MININFRA are designing an LPG Masterplan seeking to eliminate the use of charcoal
  - WB, NDF and **Rwanda Environment Management Authority** (REMA): collaboration to improve charcoal value chain in the Western Province.



- EU-funded **DESIRA** project implemented by IUCN and ENABEL in Eastern Province and around Kigali to restore degraded agricultural lands and promote sustainable biomass energy
- **Several NGOs** are developing carbon credit projects to distribute stoves for free across rural areas at major scale (threatening ReCIC's effectiveness and hence requiring coordination)
- **UN agencies**, such as WFP, UNHCR, UNDP/UNEP active in the sector, e.g. in refugee camps and schools across Rwanda

### Leverage

MoE through NDCs estimated the financial need of USD 380 million to consolidate the market of efficient cook stoves. Through RECIC action, EnDev seeks to build momentum by strengthening businesses in cookstoves and alternative fuels, as well as supporting innovation in the sector (e.g. R&D in clay improvement or design of financial schemes for producers), which will eventually attract additional investments or funding to the sector, incl. climate finance.

### Nexus

Cooking energy transformation requires collaboration with ministries and stakeholders outside of the energy sector, too, in particular:

- **Health:** Nearly 6%<sup>64</sup> of all diseases in Rwanda are directly related to IAP. By promoting its "Cooking Energy System" concept, EnDev seeks to integrate technologies (cooking device and fuel) into social contexts to improve cooking conditions and fuel provision for Rwandans.
- **Gender:** The burden of supplying firewood to households is mainly on the shoulders of women (42.8%).
- **Environment and climate:**
  - EnDev's action supports Rwanda's NDCs, whereby dissemination of modern efficient biomass cookstoves should reach 80% in rural and 50% in urban population by 2030.
  - In line with the Forestry Sector Strategic Plan (FSSP), the GoR will enforce the production of more efficiently produced ('green') charcoal, promoting also its traceability and progressively forbidding the production and trade of inefficient charcoal. EnDev will strengthen the capacity of charcoal makers for this shift.
  - EnDev expects to contribute to emission reduction of 0.2 million-ton CO<sub>2</sub>eq per year through ICS dissemination and promotion of alternative fuels

EnDev therefore supports closer ties between the **stakeholder working groups** led by different ministries in the energy, environment and health sectors.

## 1.15.5 Modalities

### Electricity

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<sup>64</sup> WHO

## **Mini-grid RBF & PUE**

To date, twelve mini-grids are operational in Rwanda, all of which received external financial support. As of 2020, the political framework has advanced, creating more clarity e.g. through the publication of the NEP, which foresees around 2000 mini-grids by 2024. This highlights that mini-grids play a key role in the GoR's off-grid electrification plan. However, economic viability and access to finance remain challenges. Since the end of the first RBF, there has been no programme offering grant support to mini-grid developers.

**Objective:** The objective of the component is to accelerate private mini-grid development through RBF and the promotion of productive use, while contributing to the continued improvement of the enabling environment.

**Approach & activities:** The component will build upon the first mini-grid RBF (2014 – 2020) and the productive use project implemented on behalf of EnDev since January 2020. The new component will offer RBF to mini-grid developers supplying electricity to rural areas that will not be connected to the grid according to the NEP. The approach is in line with national electrification targets and welcomed by private developers, donors and government.

*Mini-grid RBF:* While the new RBF will largely follow the structure of the previous one, some important adjustments will be made to address previous challenges and reflect lessons learned. This new phase will focus on solar, as the long lead and construction times for hydropower mini-grids prevented the completion of several projects under the previous RBF. This is also in line with the NDC target of constructing up to 100 solar mini-grids (68 MWp). EnDev will only select companies participating in Enabel's PSPE programme (cf. section 5) to reduce lead times and resources spent on project preparation and technical assistance. Enabel will support companies in developing feasibility studies, acquiring necessary licenses, and proposal development, which will accelerate project preparation. The planned collaboration with BRD will facilitate access to pre-commissioning financing and bridge the gap until incentives are paid out. These changes will shorten project development times and will allow EnDev to achieve its objectives more efficiently and with reduced risk. EnDev Rwanda will also continue to advise and work closely with government and donors, to further strengthen the enabling environment and resolve outstanding issues (e.g. delays in project reviews by GoR, changes to NEP demarcations, uncertainty regarding grid-arrival).

*PUE activities:* As electricity consumption by rural households in Rwanda remains low, the viability of mini-grids is reliant on commercial and productive activities. However, the uptake of productive use has often fallen short of expectations. EnDev will implement a PUE programme at six mini-grid sites to identify beneficiaries, provide business development support, offer grant funding for the acquisition of equipment and consumer appliance financing through local SACCOs/MFIs. These activities will contribute to local income generation and development, while increasing demand and the ability to pay for electricity.

*Cost-effectiveness:* The demarcation between on- and off-grid areas defined in the NEP are based on a least-cost analysis on how to achieve universal electricity access by 2024. Both on and off-grid electricity remain largely subsidised due to the country's limited energy resources, small industrial base and low purchasing power. Overall, mini-grids are a cost-

effective alternative to grid extension in remote areas, which is being subsidised. Compared to SHS, which are also being subsidised since 2020, mini-grids may be more expensive, but they offer a higher level of service and a longer lifespan. The RBF approach also exhibits cost-efficiency by promoting a competitive low-risk private-sector approach and its ability to leverage private capital through debt and equity.

### **PSP hydro**

An increasing number of hydropower developers are engaged in the construction and operation of power plants. The four projects supported by EnDev in the past are operating well with an installed total capacity of around 3 MW. EnDev is supporting three additional projects, which will be completed by 2022. The projects have reached different stages of implementation progress, between 30% and 80% of completion. The construction of civil infrastructure has advanced well, and the main remaining steps are the manufacturing, shipment and installation of electromechanical equipment. In addition, thanks to EnDev's advice and guidance, existing publicly owned small hydropower plants were leased to private companies. However, the government remains the biggest power generator.

**Objective:** The objective of PSP Hydro is to promote private small hydro power developers to accelerate access to electricity and increase generation capacity.

**Approach & activities:** Beside viability gap funding, PSP Hydro provided technical assistance to developers regarding the development of technical studies as well as the design, construction and operation of plants. Given the current stage of the three remaining projects, PSP Hydro will be supporting the construction and monitoring the operation of the power plants in order to improve the quality and thus sustainability as well as advocating with public institutions, since the private investors in the sector still lack a strong umbrella organisation.

### **Cooking**

#### **ReCIC**

Due to its extreme population density, Rwanda is one of the most vulnerable countries to deforestation. The high dependency on biomass for cooking and usage of inefficient technologies generates high emissions, affecting the climate and users' health.

**Objective:** The objectives of this component is to establish a sustainable cooking energy market, spanning demand and supply of both stoves and fuels.

**Approach & activities:** Given the nascent state of the cooking market in Rwanda, a broad and hands-on approach is required. Sustainable growth depends on improved production of and increased demand for better stoves and fuels - independent from donor-driven free distribution. None of the existing projects are tackling both fuels and stoves. EnDev will intervene on **five axes**:

- **Private sector ICS and fuels supply**
  - Supply production equipment and materials and build capacities within existing and new ICS and fuels producers to scale up standardised production
  - Support import capacities of ICS companies

- Design and implement targeted performance-based incentives to SMEs, which will compliment WB RBF
  - Improve market information through the creation of a database of companies and co-operatives.
  - Improve infrastructure for fuel production units
  - Support commercialisation of alternative fuels (pellets, briquettes, wood chips, use of agricultural residues etc.) together with cookstoves technologies
  - Roll-out an e-cooking pilot project where pertinent
- **Awareness and demand**
    - Conceptualise and roll-out out campaigns via radio or TV as well as local presentations and cooking demonstrations
    - Promote product recognition among end-users through branding systems
    - Promote fuel-saving cooking techniques and measures to reduce exposure to IAP
    - Introduce microfinance schemes with financial institutions to facilitate access to finance for households and to support access of SMEs to commercial lending
- **Availability**
    - Identify and support local producers to diversify and scale up production in Kigali and rural areas
    - Identify and support uptake of innovative business models and cookstove technologies for households, productive use and social institutions
    - Link producers, distributors and others (e.g. SACCOs, VUP, MFIs) to develop a regional distribution network for alternatives fuels and ICS
    - Develop capacity in marketing and sales along ICS and fuels value chains
- **Confidence**
    - Facilitate exchanges with successful programmes elsewhere to encourage skills transfer through matchmaking with local producers and testing centres
    - Conduct R&D in quality improvement (e.g. via geopolymers to improve clay quality)
    - Bring international expertise for improved production techniques and quality standards
- **Enabling environment**
    - Bring together the energy, environment and health sectors
    - Support the development of green charcoal standards
    - Introduce a quality control system for ICS
    - Introduce a labelling system for ICS and fuels

## 1.15.6 Results

Project results	Targets (2010 – 2024)	Additional targets (2021 - 2024)	[Other target dimensions/ indicators]
People: Access to Electricity	369,600	25,445	Of which 4,431 among most vulnerable groups

People: Access to Cooking	90,617	38,413	Of which the majority will be among the rural poor
SI: Access to Electricity	50	16	Some of which will consist of health centres
PU: Access to Electricity	368	128	Business development support to 60 businesses (min. 20 female ownership) at mini-grid sites

## Mini-grid RBF & PUE

The mini-grid programme will support the development of 2-5 mini-grids and work closely with the REF to enable access to finance. It will also continue to engage with stakeholders to work toward a conducive regulatory, planning and policy framework for mini-grid (incl. greater clarity on grid arrival and the NEP, expediting the mini-grid guideline process). Through the RBF, the programme aims to leverage EUR 105,000-150,000 in equity raised by developers and stimulate EUR 200,000-245,000 in additional debt or equity.

## ReCIC

### Climate related objectives

- Improve demand-supply balance of biomass by reducing cooking fuel consumption
- Save 0.2m tCO<sub>2</sub>eq per year

### Market-development related objectives

- Increase share of improved fuels to 25% market share
- 10 ICS production units supported

### Enabling-environment related objectives

- Introduce a quality control system and labelling system for ICS and fuels
- Support the implementation of “charcoal tax”
- Promote better sector coordination in the biomass sector

## 1.15.7 Sustainability

### Electricity sector

Building on former interventions, EnDev seeks to strengthen the long-term sustainability of the sector in several ways:

**Financial and market sustainability** is at the heart of the mini-grid RBF. The component seeks to improve the financial viability of mini-grids by providing viability gap funding, strengthening the skills of developers, promoting productive uses at mini-grid sites and working closely with the REF to ensure the availability of financing. By assisting in the development of viable projects, EnDev will strengthen the business case for mini-grids and provide proof of concept, which in turn will facilitate access to financing and investment. Collaboration with GoR will also help to establish a clear policy environment which will boost investor

confidence. With developers poised to invest over EUR 29 million<sup>65</sup>, there is the potential for significant growth if these investments can be unlocked. EnDev also hopes to catalyse local lending by showcasing successful projects funded by the REF, which focuses on stimulating commercial bank lending to the sector.

**Institutional sustainability** has improved significantly over the last years for mini-grids and e-waste management. Between 2016 and 2020 the enabling environment evolved rapidly with several policies, guiding documents and regulations having been adopted. Roles and responsibilities of various actors such as the utility, regulator and sector ministry have also been clearly defined, which enables smooth implementation. However, some uncertainty remains. In the mini-grid sector, greater clarity is needed regarding the NEP, grid arrival as well as government buy-in for mini-grids in the long-term. For grid-connected small hydro-power plants, the institutional environment has become more uncertain. Due to overgeneration, the utility has been refusing to sign or renew Power Purchasing Agreements (PPA) with private producers, thereby threatening private investment. EnDev is actively engaging with GoR on this issue to establish greater clarity for private investors. Regarding gender capacity, key institutional partners (e.g. REG) have gender officers and policies and are promoting the advancement of women. REG e.g. is participating in the Women in Rwandan Energy (WIRE) initiative by offering internships, trainings and planning the first solely female run hydropower plant. EDCL also specifically monitors electrification in female headed households. Female-headed low-income households are also generally prioritised by EDCL in electrification planning. Where possible EnDev engages with partners and initiatives i.e. WIRE to promote gender sensitivity and capacity.

The **Ecological sustainability** of solar mini-grids supported by EnDev is generally ensured due to their long lifespan. Only the disposal of broken components, particularly batteries, if not done properly may pose environmental risks. EnDev will sensitise developers regarding the dangers of improper disposal and will encourage the disposal of any e-waste through Enviroserve, a local e-waste dismantling and recycling facility. Under PSP hydro, environmental impacts are minimal due to the small scale of supported projects. A range of measures will be introduced to developers and taken to ensure ecological sustainability (see chapter 9 for details). Overall, supported technologies and projects will positively contribute to emissions reductions and low carbon development.

**Technological sustainability** is largely ensured in the mini-grid sectors and micro hydro-power sector. While the technology is imported, replacement parts are available from suppliers, and developers have the required know-how to make repairs. For mini-grids, the main challenge to date is the availability of operational capital to fund unexpected repairs (e.g. storm damage), which will be addressed through the improvement of the financial viability of projects (see above).

Ensuring **social sustainability** is largely outside of EnDev's control under the mini-grid and PSP hydro component. Electricity tariffs are regulated by RURA and, in the case of mini-grids, are negotiated between the developer and local communities during the project preparation phase. As before, EnDev will provide advice on mini-grid tariffs based on previous

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<sup>65</sup> Source: Energy Private Developers (EPD), Rwandan energy industry association

experiences to avoid negative social impacts. Customers being serviced by PSP support hydropower plants pay the grid electricity tariff.

EnDev will pursue a **hand-over strategy** for the mini-grid component. The utility has already voiced an interest in learning more about designing and managing an RBF for mini-grids. EnDev will continue to engage with the utility and sector ministry to build capacities and foster the necessary buy-in to enable a hand-over to government partners, as was done with the Pro Poor RBF.

## Cooking energy sector

EnDev Rwanda's cooking energy component is deeply motivated by seeking sustainability in all dimensions:

**Financial and market sustainability** is at the heart of the chosen approach. It seeks to build capacity with stove and fuel producers, innovation and standardisation in the sector in order to develop a more robust businesses that sell better and affordable products, without depending on subsidies. Raising end-user's awareness with regard to the advantages of ICS, therefore, is of fundamental importance, because it creates the required 'market-pull'. This market-centred ambition sets EnDev apart from many other actors, who often approach the sector with a "relief-mindset". In line with this approach, a key indicator focuses on regular market output.

**Institutional sustainability** is sought by anchoring the activity with all political entities with relevance in the biomass sector. The steering committee will therefore seek to engage not only the ministry in charge of energy (MININFRA) but also those in charge of the environment (MoE) and health. For the everyday implementation, the component seeks a tight connection with EDCL. By coordinating activities very closely, EnDev will have the required backing e.g. vis-à-vis local government, while at the same time building capacity in a "learn-by-doing" approach with EDCL. Important tools, also, shall be shared or even hosted by EDCL, e.g. a database of ICS companies. Finally, EnDev will seek to establish a sector-wide labelling and quality control system, engaging all relevant stakeholders from the public and private sector, for ongoing collaboration.

**Ecological sustainability** is a direct consequence of the action foreseen in this component. CO<sub>2</sub> emissions reduction is an overarching goal of the component, which – accordingly – is funded through the GCCA+. Also, it seeks to contribute to GoR's NDC by disseminating modern efficient cookstove in both urban and rural areas hence reducing firewood and fossil energy consumption for cooking. Another central challenge for Rwanda is the degradation of the forest resource. The project therefore focuses also on the fuel-side of the market, which intends to equip producers with skills and technology that improve the carbonisation process of charcoal as well as production of alternative fuels (i.e. briquettes and palettes). Here, the project will target stove producers involved in legal fuel production, seeking to give them advantage over producers of illegal and unsustainable charcoal production.

**Technological sustainability:** while other actors' projects often focus heavily on higher-tier solutions which rely on imports of entire stoves, EnDev seeks to support existing manufacturers of stoves (or bricks) to incrementally refine their capacity to provide products of increasing quality. Nonetheless, EnDev will seek to support appropriate research and



development (e.g. in the area of clay quality) as well as the introduction of electric cooking in urban areas. EnDev benefits from its two-pillar approach, which tackles both stove and fuels alternatives simultaneously. In addition, for its company database (cf. section on modalities) and other software-based tools EnDev will prefer open-source software.

**Social sustainability** stemming from improved stoves and cooking techniques will benefit particularly poor families as they will be less burdened by wood collection and exposure to harmful pollutants into the air. Furthermore, the project avoids end-price subsidies and it will instead provide incentives to support operations costs (i.e. production and distribution). That way, incentives will not create tensions between end-users due to some being more privileged than others. However, it should be mentioned that the promotion of these low-tech solutions might lead to some tension with other, incl. governmental, stakeholders, some of who prefer higher tier stoves over affordable lower tier stoves or promote shifting away from biomass altogether in the near future – a challenge for EnDev. In this context, EnDev will frame its approach as a necessary “transition” towards clean cooking in Rwanda.

EnDev will pursue a **hand-over strategy** for the cooking energy component. As the approach is very broad, different institution will take over different roles. EnDev will continue to engage with the utility as well as the ministries of health, environment and infrastructure to build capacities and foster their buy-in.

### 1.15.8 Gender Strategy and Safeguards

**Gender strategy:** GIZ Rwanda has a very active *one mainstreaming* team and strategy embedded in each project. Several activities have already been implemented and further activities are foreseen within GIZ. EnDev regularly engages with entrepreneurs on gender sensitive hiring process as well as the integration of people with disabilities and people with HIV. Hiring guidelines, including positive impacts of diverse workforces, reminders to the Rwandan laws and GIZ work guidelines etc. are provided as well as trainings and workshops. Finally, EnDev undertook a complete Do No Harm analysis in 2018 and is regularly working with an expert on those questions to make sure the project respects the guidelines of GIZ in a culturally sensitive context. Moving forward on gender equality, EnDev will extend these activities to also engage female entrepreneurs and women in the energy sector directly through workshops and will identify other relevant activities for promoting gender equality, contingent upon available capacities and the evolution of the COVID pandemic. Under the **mini-grid** component, EnDev will e.g. aim to work with at least one female-led mini-grid company, dependent on the Enabel pipeline, and provide support to a minimum of 20 female entrepreneurs under the PUE activities (a third of the PUE programme beneficiaries). EnDev will also continue to provide gender-disaggregated data on its activities.

EnDev’s activities in the **cooking sector** will particularly emphasise gender equality in producing and supplying improved cooking solutions. ReCIC will contribute to the EU Gender Action Plan (2016-2020), particularly to the objectives 15, 16 and 20. In this context, EnDev will sensitise all stakeholders to ensure awareness of related gender implications and opportunities, e.g. equal rights to own land, access financial services and strengthen women’s leadership. ReCIC includes gender-specific indicators i.e. (1) female participants in producer trainings, and (2) women as main target group for all awareness campaigns on modern cooking services.

**Social and environmental safeguards:** EnDev's impact assessment for **PSP hydro** showed that while supported micro hydropower plants may negatively impact the physical<sup>66</sup>, biological<sup>67</sup> and socioeconomic<sup>68</sup> environment, the impact is minimal due to the small project scale (300 – 1.300 kW) and can be mitigated through appropriate safeguards, incl. through design solutions and introduction of operational procedures. Resettlements are not required, and the construction area will be reforested to avoid erosion and land degradation.

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<sup>66</sup> erosion, change in land use pattern, clogging water ways, silting of constructed infrastructure

<sup>67</sup> deforestation, loss of agricultural land

<sup>68</sup> social conflicts, professional accidents

# 1.16 Senegal

## 1.16.1 Summary and key data

Promoted technologies	   		
	<p><b>Rural Electrification</b> The approach on rural electrification is structured into five <b>components</b>:</p> <ol style="list-style-type: none"> <li>I. “Build back better” the operator-based energy supply systems (mini-grids, SHS) in the ERIL;</li> <li>II. Foster market-based access for standalone solar solutions through PayGo companies;</li> <li>III. Support market development for PUE devices in both sub-markets (ERIL and PayGo);</li> <li>IV. Increase transfer of learnings in the sector both institutionally (ASER) and bilaterally;</li> <li>V. Support coordination and collaboration in the sector of rural electrification.</li> </ol> <p><b>Cooking Energy</b> The approach on cooking energy has significantly changed compared to the approved 2019 proposal. The household ICS topic has been handed over to the new EnDev/GCF project.</p> <p>Promotion of productive uses of biomass energy with a first focus on fish processing.</p> <p><u>In both sectors</u>, COVID-19 has already had a significant impact (while the end of the pandemic is not yet reached). This will require complementary interventions and regular adjustments during implementation.</p>		
Summary of proposed interventions			
	<b>Quantitative targets [# of]</b>		<b>Further relevant impacts/outcomes</b>
Energy for lighting / electrical appliances in households	20,181	People	Women economic empowerment (women group approach)
Cooking / thermal energy for households	37,443	People	
Electricity for social infrastructure	200	SI	
Energy for productive use / income generation	925	MSMEs	Women economic empowerment (female fish processors) and improved nutrition
Project period	01.01.2021 – 31.12.2023	<b>Indicative budget</b>	5,100,000 EUROS

The activities under the **components** of rural electrification and cooking energy have been structured using **key interventions** aligned with the ToC of the global EnDev program:

- (1) Training, business development, hardware;
- (2) Awareness raising and marketing (NEW);
- (3) Access to finance;
- (4) Evidence, learning transfer and innovation;
- (5) Policy advice and capacity development, and
- (6) Partnerships and alliances.

## Introduction

In 2019, the Governing Board approved the Basic Proposal for EnDev Senegal (as an A-country) with a timeline until 12/2022. It was written without the consideration of the (at the time only potential) additional financing through the Green Climate Fund (GCF) and Grüne Bürgerenergie (GBE) as these had not yet been approved. Both projects were initially planned as co-financing to EnDev and only at a later stage evolved as separate projects. Since early 2019, the EnDev team was mainly preparing the two new projects, while keeping some activities of the EnDev program going. Larger new interventions (e.g. “comparing mini-grids with individual systems in a free market approach”) were postponed for the time after the new projects would be running.

- In January 2020, GBE was approved, and staff was recruited. By April 2020, GBE was operational (but blocked by COVID-19).
- The EnDev/GCF project was launched in November 2020, and full implementation is expected early 2021.

The impact of the two new programs on the EnDev components is diverse:

- In the sector of **rural electrification**, the GBE project has little impact on the original EnDev planning as it is neither considering household connections nor EnDev intervention zones.
- For the sector of **cooking energy**, the new EnDev/GCF project is basically taking over the team and the concept of EnDev Senegal on household ICS. This required a new orientation for the future interventions of EnDev in respect to cooking energy. Two interventions of the current phase will still be implemented under the proposed funding: pilots on ‘biomass fuel production’ and ‘activities on sector support’. As these were already described and approved in the AP 2019 update, they will not be any further elaborated on in this document.

In the view of these developments, EnDev management decided to downgrade Senegal to a B-country with less annual budget and shorter duration.

### So what is new? Some highlights:

1. **Digitalization** of rural electrification for increasing resilience of operator-based fee-for service village energy systems;
2. Promotion of **standalone systems** through PayGo companies as a second pillar of the program;
3. Systematic promotion of **PUE technologies** in both subsectors (operators & PayGo);
4. **New opportunities**: Mainstreaming EnDev experiences on rural electrification into large initiatives (e.g. EU project PADERAU);
5. **Fish-smoking**: Developing markets for PUE technologies in the cooking energy component.

For both components, the impact of COVID-19 on the markets and the safety of our team will be a constant reason for reviewing the planned activities for the years to come.

## 1.16.2 Theory of change (ToC) and state of market

### Rural Electrification

#### State of the “market”

The GoSN is planning to reach 95% of the rural population with the national grid by 2025. Combined with off-grid solutions like mini-grids, universal access to electricity shall be achieved until then. Compared to this objective, the growth in access to modern energy services and products for households, small enterprises and social institutions in remote rural areas in Senegal is growing slower than anticipated (**core problem**).

#### The ERIL subsector

The “local initiatives for rural electrification” (ERIL) form the largest off-grid subsector. It is a concept where private sector companies supply electricity (through mini-grids or SHS) in a fee-for-service arrangement to clients as contract-operators for the rural electrification agency (ASER). In 2020, the EnDev-supported mini-grid operators lost 26% of their clients compared to 2019. Eleven mini-grids with more than 400 connected households went out of service. However, this is not just an effect of the pandemic. COVID-19 has only accelerated problems that EnDev has been working on addressing since 2016. Several factors (**root causes**) and their reasons (**barriers**) are contributing to the problems:

- a) **Clients of existing mini-grids are increasingly reducing or refusing payment of fees, and the operators and their local mini-grid caretakers are reluctant to enforce good consumer behaviour (i.e. full payment of bills, energy saving measures, penalising fraud, etc.) because of the heated situation.**

This has been caused by (1) the incomplete implementation of tariff-harmonization at national level (politicians promised consumers to pay the lower tariffs of SENELEC), and (2) the decreasing quantity and quality of electricity services as an effect of lower maintenance work during the COVID-19 crises (lockdown);

- b) **Operators are increasingly worried about the security of their investments into maintaining and repairing their mini-grids / SHS and the viability of their business.**

The main barriers are (1) the decreasing level of payment (clients refuse to pay or simply have no money due to COVID-19), (2) social acceptance of the fees (see ‘a’) above), (3) the lack of payments for electricity use in social institutions and for street lights (communities have not budget for that), (4) lack of valid exploitation contracts for the operators (as government wants to implement the harmonisation of the tariff first), and (5) the uncoordinated expansion of the national grid (threatening to connect villages of operators leading to loss of investments). As an example, 4 concessions have been recently given for exploitation to the national utility SENELEC, who decided to connect 55 EnDev-supported villages (25 mini-grids and 30 SHS villages).

- c) **The current operation model for ERIL installations (mini-grids and SHS) is highly vulnerable to external shocks. This has become very visible during the lockdown in the context of the COVID-19 pandemic.**

Major barriers are (1) the limited capacity of some operators to effectively manage the infrastructure, (2) the dependency of the management system on frequent visits of staff in the villages (for advising the local caretaker, maintaining and repairing the systems,

collection of fees), (3) the limited availability of spare parts for the components at national level, (4) the low effectiveness of the management of mini-grids by the village-based care takers (due to lack of capacity and/or lack of motivation), (5) limited liquidity of operators to invest into repair and replacement, and (6) the lack of support and control by ASER to ensure that operators effectively manage the systems.

d) **Operators have low income from electricity use during daytime.**

Main reasons (barriers) for this are (1) there has not been a systematic approach to encourage the use of PUE applications in mini-grids or as standalone systems. This was partially because (2) the initial design of the systems (including capacity) was only focusing on domestic use. (3) Clients in the villages are also not much aware of opportunities of using electricity-driven technologies for their businesses.

e) **New (ODA financed) investments in off-grid electrification often replicate old approaches (with known weaknesses) or reinvent innovations that already have been tested.**

The ERIL concept came into life because EnDev invested into testing the concept (2006-2010). Based on the successes, other programs and the government started to replicate the concept. EnDev learned a lot with regards to the technical outline and various aspects of sustainability. Unfortunately, many new (e.g. ODA financed) initiatives do not yet consider these findings and tend to replicate the old set-up with its weaknesses. ASER as the “owner of the sector” did not systematically inform all stakeholders, and EnDev was limiting itself to bilateral ‘on-demand’ share of lessons learned.

### The PayGo market

The market for ‘standalone’ systems is predominantly serviced by PayGo companies offering PV systems with leasing contracts and after sales services to clients for domestic or productive uses (e.g. solar water pumping).

**The contribution to the growth of the sector is limited as the suppliers of solar PV products (both domestic use and commercial applications) are increasing their annual sales volume and their geographic coverage (including density of sales points) rather slowly (root cause).**

This has been caused by the following barriers: (1) Technicians have to travel long distances in remote rural areas for serving few clients with the installation of new devices or providing after sales services (high service costs), (2) the suppliers use their own limited liquidity for importation and prefinancing of systems for their clients (the market volume is limited), (2) the repayment of systems is slow and there is a significant dropout rate (slow turnover and liquidity loss), (3) the awareness and/or trust of the rural population in solar off grid solutions for households and small businesses is limited (lowering the demand), (4) low purchasing power and/or payment discipline of clients (decreasing the income of the supplier), and (5) PayGo companies have difficulties to assess if their applicants are solvent or not.

### The PV sector overall

Currently there is no clear strategy on how waste in the PV sector (both mini-grids and stand-alone systems) can be treated safely in Senegal. The private sector is left alone with this problem. This is a threat to the ecological sustainability of the sector due to environmental damages and potential health impacts.



## Theory of Change - EnDev [Senegal: Rural Electrification]

<b>Indirect impacts at national level</b>	Increased speed of growth in rural electrification supports achieving national (and international) targets		
<b>Indirect impacts at target group level</b>	<b>Energising Lives - Social development</b> a) Increasing number of HH benefit from more reliable power supply; b) Lighting provides better learning environment in connected households; c) Social institutions with capacity to pay for the electricity can provide more reliable, better services (health and education); d) More women are investing into their personal PV system.	<b>Energising Opportunities - Economic development</b> a) Increase of number, intensity and diversity of productive uses in project villages; b) more significant private investments into PUE; c) more significant impacts on employment by PUE.	<b>Energising Climate - Combating climate change</b>  No significance for this component
<b>Direct impact</b>	<b>Accelerated growth of access to modern energy services and products for households, small enterprises and social enterprises in rural areas in Senegal (both in ERIL as well as in the free market).</b>		
<b>Assumptions</b>	a) ERIL operators reinvest their increased income from mini-grids (and commercial loans) for further improving the quality and quantity of their services; b) Operators, agents, local caretakers and clients master the digital challenges of the new operating system; c) PUE is improving the viability of small businesses and is contributing to increased employment and income generation; d) ASER has a genuine interest that investors use lessons learnt in the sector of mini-grids; e) PayGo companies use their improved access to finance to scale up their current business.		

<b>Outcome</b>	<p>a) An increasing number of satisfied clients of mini-grids use mobile money payments for timely recharging their prepaid, kWh-based meter. They willing and practiseses. The relationship with the service provider is improved.</p> <p>b) ERIL operators are encouraged by an inceased institutional (contract), social (client satisfaction), technical (maintenance and repair) and economic (their investments). They better understand how to operate their ERIL as a business and work with more professional service providers up to village level ensure professional management of the assets under their ERIL.</p> <p>c) The new operation model supported by digital formats is reducing the role of on-site visits to adress larger technical problems, which are faster detected management of the systems. The maintenance is improved by the use of more durable components that can be sourced within the country.</p> <p>d) An increasing number of small enterprises in the ERIL pay for electricity use during day time. First social institutions start paying for the electricity the</p> <p>e) ASER is actively infoming new (ODA financed) investors (in off-grid electrification) about the institutional knowledge documented on the mini-grid adv serves as advisor for further questions. The new EU program PADERAU is considering the advice of EnDev in their planning and implementation (and collaborator).</p> <p>f) (PayGO) Companies increase their investments into sales volume and densifiation of services in the interventions zone of EnDev and beyond.</p> <p>g) stakeholder in the sector start applying recommended measures to avoid or treat safely waste in the PV-sector.</p>		
<b>Assumptions</b>	<p>a) Dissatisfaction of ERIL clients is genuine and not an expression of a political conflict with the current government;</p> <p>b) ERIL operators have a genuine interest and motivation to make their systems work viably (not just harvesting the ODA support);</p> <p>c) The mobile networks required for the digital remote manangement are working reliably throughout the year;</p> <p>d) There are viable business cases for PUE available at village level;</p> <p>e) ASER considers the knowledge management in the mini-grid sector as its genuine tasks and allocates adequate (human) resources to it;</p> <p>f) PayGo companies take the risk of the new financing opportunities to invest into expanding their business outreach;</p> <p>g) The government is making all necessary provisions to fully implement the harmonization of tariffs on the ERIL level;</p> <p>h) The government is finalizing and signing the contract of the operators;</p> <p>i) Economic recovery after COVID-19 provides more purchase power to rural households.</p>		
	<b>Supply side results</b>	<b>Demand side results</b>	<b>Enabling environment results</b>

<p><b>Outputs and results</b></p>	<p><u>ERIL sector / sale of energy services:</u>  a) Capacities of ERIL operators to effectively manage the offgrid power supply infrastructure are increasing over time;  b) Gradually, the frequency of visits of operator staff in the villages can be reduced;  c) Components in new mini-grid concept are based on local procurement;  d) Operators and ASER play different active roles in the promotion of PUE in mini-grids. The new concept of ERIL provides more capacity for PUE;  e) Increased liquidity of ERIL operators for investments;  f) The village-based caretakers are increasingly improving the effectiveness of their mini-grid management;  g) ASER and the ERIL operators develop an effective management system for the mini-grids.</p> <p><u>Free market / sale of products:</u>  a) Over time, the density of clients in the target region is increasing, reducing the distances between the sites where services have to be delivered;  b) Suppliers gain additional access to commercial financing opportunities to complement their own limited liquidity for importation and prefinancing of systems for their clients;  c) The repayment rate of systems is improving, while the drop-out rate is reducing.</p>	<p><u>ERIL sector / sale of energy services:</u>  a) Clients of mini-grid electricity are increasingly satisfied with improving service quality;  b) Pilots successfully demonstrate that SI can generate sufficient income to pay for electricity fees;  c) Pilot communities successfully test approaches to generate funds for financing fees for street lighting;  d) Increased awareness on devices for productive uses of electricity in project target villages.</p> <p><u>Free market / sale of products:</u>  a) Women groups inform their members and friends about conditions and benefits of different solar off-grid solutions for households and small businesses;</p>	<p><u>ERIL sector / sale of energy services:</u>  a) Coordination amongst stakeholders between the national grid and off-grid electrification holders use the same reference system;  b) Government actors and donor groups towards introduction of SENELEC tariffs;  c) ASER is using the advisory platform in the sector;  e) Up to 25 EnDev-supported mini-grids connect to SENELEC to the national grid, providing services to clients.  f) ASER and MPE will discuss proposals for regulation in the PV sector with stakeholders, donors, NGOs).</p> <p><u>Free market / sale of products:</u>  a) PayGo companies use a Credit Reference System to reduce the risk of low payments and high dropout rates;  b) ASER and MPE will discuss proposals for regulation in the PV sector with stakeholders, donors, NGOs).</p>
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**Training, business development, hardware:**

- a) Introduction of more durable components in mini-grids to reduce the need for maintenance and replacement (e.g. Li-batteries) from suppliers in Senegal;
- b) Introduction of a digital payment system for electricity fees (e.g. prepaid smart meters, mobile money kiosks);
- c) Professionalisation of the village based caretakers (a.o. work contracts, remote guidance system for maintenance tasks per smartphone, performance monitoring, collaboration with the operators);
- d) Professionalisation of mini-grid operators and their agents (BDS training, technical training);
- e) Facilitation of a framework agreement between ASER and operators for the management of the ERIL equipment;
- f) Facilitate business collaboration between suppliers of PUE devices and operators of mini-grids as a distribution system for PUE equipment;
- g) Providing BDS advice and/or training to PayGo agents as required;
- h) Piloting a new mini-grid concept that is able to meet current and future community energy needs with special focus on PUE development;

**Awareness raising and marketing:**

- a) Support ASER and operators in 'village client dialogue sessions' on tariff harmonization, service quality, new payment systems etc.;
- b) Support ASER in creating awareness on PUE technology opportunities in EnDev ERIL;
- c) Use EnDev/GCF contact to 8,000 women groups for sensitisation and promotion of PV products (linking interested groups to suppliers);

**Key interventions****Access to finance:**

- a) RBF ERIL Resilience Fund (potentially, if more funding is granted): Promoting maintenance and improvement of service by RBF incentives in collaboration with GBE/GIZ, providing technical advisory for proposals (Exemplary eligible measures: Remote monitoring, smart regulators/meters, durable batteries, extending capacity);
- b) Piloting a new approach for social institutions accessing funds to pay for access to electricity (in collaboration with GBE/GIZ);
- c) Supporting ASER in the implementation of a revolving fund for PUE technologies;
- d) Advising and potentially collaborating with new PADERAU program of EU in implementing a RBF approach for PayGo solar products;
- e) Support development and piloting of a Credit Reference System for PayGo companies to verify solvency of potential clients;
- f) Supporting GBE/GIZ in facilitating access to finance for PayGo companies (particularly in the PUE sector);
- g) Facilitating women groups to use their traditional group financing system ("tontine") also for PV products (if found adequate);

**Evidence, learning transfer and innovation:**

- a) Documenting lessons learnt from new technical mini-grid concepts and new operation models (including digitalization) as well as PUE interventions;
- b) Advising the new EU PADERAU Program on EnDev lessons learnt during concept development (and potentially implementation): RBF approaches, performance monitoring, etc.
- c) Supporting ASER in the creation of an advisory platform for mini-grids for sharing lessons learnt with interested partners in the sector including PUE I
- d) Reaching out to other stakeholders in the PayGo subsector for better knowledge of their lessons learnt including PUE;

**Policy advice and capacity development:**

- a) Development and introduction of a geospatial tool for national electrification planning;
- b) Continuation of lobbying for the signing of the (already developed) contracts for mini-grid operators;
- c) Supporting PED/GIZ in the development of a strategy for the treatment of waste in the PV-sector of Senegal

**Partnerships and alliances:**

- a) Supporting SENELEC in managing the concessions with EnDev mini-grids (including facilitation of a smooth connection of 20 EnDev mini-grids to the national grid);
- b) Advising (on EnDev lessons learnt) and potentially collaborating in the implementation of the upcoming large PADERAU programme of EU on rural electrification;
- c) Support PED/GIZ programme in lobbying for the full implementation of the tariff harmonization (also in the donor group);
- d) Collaboration with Plan International in the promotion of PUE in villages electrified with support of EnDev.

	<b>Supply side barriers</b>	<b>Demand side barriers</b>	<b>Enabling environment barriers</b>
<b>Barriers</b>	<p><u>ERIL sector / sale of energy services:</u></p> <ul style="list-style-type: none"> <li>a) Capacities of some operators to effectively manage the off-grid power supply infrastructure are still limited;</li> <li>b) The management system is dependent on frequent visits of operator staff in the villages (repairs, collection of fees, etc.);</li> <li>c) Operators face difficulties in sourcing certain spare parts;</li> <li>d) Operators and/or ASER do not systematically promote the use of devices for commercial activities to the clients in their mini-grids and standalone systems. Old ERIL concept did not provide capacity for larger PUE;</li> <li>e) Operators have very limited liquidity for investments;</li> <li>f) The management of the mini-grids by the village based caretakers is not very effective (lack of capacity and motivation);</li> <li>g) ASER does not very actively support and control the operators for ensuring an effective management of the mini-grids and SHS.</li> </ul>	<p><u>ERIL sector / sale of energy services:</u></p> <ul style="list-style-type: none"> <li>a) Clients of mini-grid electricity are increasingly dissatisfied with decreasing service quality and high tariffs compared to SENELEC;</li> <li>b) recent problems with payments of electricity fee (low liquidity due to COVID-19);</li> <li>c) social institutions in rural villages have no budget for paying electricity bills;</li> <li>d) communities do not pay for street lighting;</li> <li>e) low awareness on devices for productive uses of electricity.</li> </ul>	<p><u>ERIL sector / sale of energy services:</u></p> <ul style="list-style-type: none"> <li>a) Lack of coordination amongst stakeholders of the national grid and off-grid electricity;</li> <li>b) incomplete implementation of tariff harmonization at the national level (including funding problem for cost recovery);</li> <li>c) Continued non-official status of operators (contracts still not signed);</li> <li>d) ASER is not adequately informing clients about (ODA) investments into off-grid power generation;</li> <li>e) SENELEC has been allocated 4 contracts to connect many existing mini-grids to the national grid;</li> <li>f) There is no general strategy how to deal with e-waste in an environmentally acceptable way.</li> </ul>

	<p><u>Free market / sale of products:</u>  a) Technicians have to travel long distances in remote rural areas for serving few clients with installation of new devices or providing after sales services;  b) Suppliers use their own limited liquidity for importation and prefinancing of systems for their clients;  c) The repayment of systems is slow and there is a significant dropout rate.</p>	<p><u>Free market / sale of products:</u>  a) lack of awareness and/or trust in solar off-grid solutions for households and small businesses;  b) low purchasing power and/or payment discipline.</p>	<p><u>Free market / sale of products:</u>  a) PayGo companies have difficulties to determine if they are solvent or not.  b) There is no general strategy how to properly treat e-waste in an environmentally acceptable way.</p>
<p><b>Assumptions</b></p>	<p>a) Clients would have the money to pay their fee, it is just that they refuse to pay and not a poverty problem;  b) Operators reinvest their income from the collected fees into their ERILs;  c) Village caretakers could in principle play an important role in the management of the mini-grids;  d) The rural population is in principle interested in an commercial access to electricity services or products;  e) The selection of villages for rural electrification is based on a planning process; Stakeholders would in principle like to avoid overlapping plans;  f) New investors into rural off-grid electrification are in principle interested to benefit from lessons learnt in the sector;  g) Agents of PayGo companies would like to screen their potential clients for solvency before signing contracts.</p>		
<p><b>Root causes</b></p>	<p>a) Clients of existing mini-grids are increasingly reducing or refusing payment of fees (because of the quality and conditions of the service they receive); Operators are reluctant to enforce good consumer behaviour (i.e. full payment of bills, energy saving measures, penalising fraud etc.);  b) Operators are increasingly worried about the security of their investments into maintaining and repairing their mini-grids / SHS and the viability of their business model (due to the low social acceptance of the fees, expansion of the national grid, lack of valid contracts);  c) The current operation model for ERIL installations (mini-grids and SHS) is highly vulnerable to external shocks;  d) Operators have low income from electricity use during day time (e.g. from small enterprises);  e) New (ODA financed) investments in off-grid electrification often replicate old approaches (with known weaknesses) or reinvent innovations that have already failed;  f) The suppliers of solar PV products (both domestic use and commercial applications) are increasing their annual sales volume and their geographic coverage (through new sales points) rather slowly.  g) stakeholders in the PV-sector do not treat waste in the PV sector safely.</p>		

<b>Assumptions</b>	<ul style="list-style-type: none"> <li>a) If tariffs and service quality are acceptable, rural households are prepared to stay connected and pay their fees to operators (it is NOT a political constraint);</li> <li>b) If conditions are right, operators in the ERIL have a viable business case and would maintain current level of connected households as well as invest in new clients;</li> <li>c) External shocks have occurred in 2020 (COVID-19);</li> <li>d) There are economic viable opportunities for the use of electricity in small enterprises in off-grid remote rural villages.</li> </ul>		
<b>Core problem</b>	<b>Access to modern energy services and products for households, small enterprises and social institutions in remote rural areas is growing slower than anticipated (both in ERIL as well as in the free market).</b>		
<b>Impacts of the core problem at target group level</b>	<b>Social development:</b> <ul style="list-style-type: none"> <li>a) low increase of household income from use of electricity for productive activities;</li> <li>b) use of electricity in social institutions (e.g. health posts, schools) is vulnerable due to non-payment of electricity bills;</li> <li>c) women have only a small role in households' decisions on access to electricity.</li> </ul>	<b>Economic development:</b> <ul style="list-style-type: none"> <li>a) low diversity of electricity use for income generating activities;</li> <li>b) only few and mostly small private investments in PUE (mill, freezer, welding machine, etc.).</li> </ul>	<b>Combating climate change:</b>  No significance for this component
<b>Impacts of the core problem at national level</b>	Current speed of growth in rural electrification is insufficient to meet national (and international) targets		

<b>Theory of Change - EnDev [Senegal: Rural Electrification]</b>	
<b>Indirect impacts at national level</b>	Increased speed of growth in rural electrification supports achieving national (and international) targets



<b>Indirect impacts at target group level</b>	<b>Energising Lives - Social development</b> a) Increasing number of HH benefit from more reliable power supply; b) Lighting provides better learning environment in connected households; c) Social institutions with capacity to pay for the electricity can provide more reliable, better services (health and education); d) More women are investing into their personal PV system.	<b>Energising Opportunities - Economic development</b> a) Increase of number, intensity and diversity of productive uses in project villages; b) more significant private investments into PUE; c) more significant impacts on employment by PUE.	<b>Energising Climate - Combating climate change</b>  <b>No</b> significance for this component
<b>Direct impact</b> <b>Accelerated growth of access to modern energy services and products for households, small enterprises and social institutions in remote rural areas in Senegal (both in ERIL as well as in the free market).</b>			
<b>Assumptions</b>	a) ERIL operators reinvest their increased income from mini-grids (and commercial loans) for further improving the quality and quantity of their services; b) Operators, agents, local caretakers and clients master the digital challenges of the new operating system; c) PUE is improving the viability of small businesses and is contributing to increased employment and income generation; d) ASER has a genuine interest that investors use lessons learnt in the sector of mini-grids; e) PayGo companies use their improved access to finance to scale up their current business.		

<b>Outcome</b>	<p>a) An increasing number of satisfied clients of mini-grids use mobile money payments for timely recharging their prepaid, kWh-based meter. They willingly apply efficient devices and practices. The relationship with the service provider is improved.</p> <p>b) ERIL operators are encouraged by an increased institutional (contract), social (client satisfaction), technical (maintenance and repair) and economic (income/viability) security of their investments. They better understand how to operate their ERIL as a business and work with more professional service providers up to village level. ASER is helping them to ensure professional management of the assets under their ERIL.</p> <p>c) The new operation model supported by digital formats is reducing the role of on-site visits to address larger technical problems, which are faster detected based on remote data management of the systems. The maintenance is improved by the use of more durable components that can be sourced within the country.</p> <p>d) An increasing number of small enterprises in the ERIL pay for electricity use during day time. First social institutions start paying for the electricity they consume.</p> <p>e) ASER is actively informing new (ODA financed) investors (in off-grid electrification) about the institutional knowledge documented on the mini-grid advisory platform. EnDev serves as advisor for further questions. The new EU program PADERAU is considering the advice of EnDev in their planning and implementation (and potentially using EnDev as a collaborator).</p> <p>f) (PayGO) Companies increase their investments into sales volume and densification of services in the interventions zone of EnDev and beyond.</p> <p>g) stakeholder in the sector start applying recommended measures to avoid or treat safely waste in the PV-sector.</p>		
<b>Assumptions</b>	<p>a) Dissatisfaction of ERIL clients is genuine and not an expression of a political conflict with the current government;</p> <p>b) ERIL operators have a genuine interest and motivation to make their systems work viably (not just harvesting the ODA support);</p> <p>c) The mobile networks required for the digital remote management are working reliably throughout the year;</p> <p>d) There are viable business cases for PUE available at village level;</p> <p>e) ASER considers the knowledge management in the mini-grid sector as its genuine tasks and allocates adequate (human) resources to it;</p> <p>f) PayGo companies take the risk of the new financing opportunities to invest into expanding their business outreach;</p> <p>g) The government is making all necessary provisions to fully implement the harmonization of tariffs on the ERIL level;</p> <p>h) The government is finalizing and signing the contract of the operators;</p> <p>i) Economic recovery after COVID-19 provides more purchase power to rural households.</p>		
	<b>Supply side results</b>	<b>Demand side results</b>	<b>Enabling environment results</b>

<p><b>Outputs and results</b></p>	<p><u>ERIL sector / sale of energy services:</u></p> <ul style="list-style-type: none"> <li>a) Capacities of ERIL operators to effectively manage the offgrid power supply infrastructure are increasing over time;</li> <li>b) Gradually, the frequency of visits of operator staff in the villages can be reduced;</li> <li>c) Components in new mini-grid concept are based on local procurement;</li> <li>d) Operators and ASER play different active roles in the promotion of PUE in mini-grids. The new concept of ERIL provides more capacity for PUE;</li> <li>e) Increased liquidity of ERIL operators for investments;</li> <li>f) The village-based caretakers are increasingly improving the effectiveness of their mini-grid management;</li> <li>g) ASER and the ERIL operators develop an effective management system for the mini-grids.</li> </ul> <p><u>Free market / sale of products:</u></p> <ul style="list-style-type: none"> <li>a) Over time, the density of clients in the target region is increasing, reducing the distances between the sites where services have to be delivered;</li> <li>b) Suppliers gain additional access to commercial financing opportunities to complement their own limited liquidity for importation and prefinancing of systems for their clients;</li> <li>c) The repayment rate of systems is improving, while the drop-out rate is reducing.</li> </ul>	<p><u>ERIL sector / sale of energy services:</u></p> <ul style="list-style-type: none"> <li>a) Clients of mini-grid electricity are increasingly satisfied with improving service quality;</li> <li>b) Pilots successfully demonstrate that SI can generate sufficient income to pay for electricity fees;</li> <li>c) Pilot communities successfully test approaches to generate funds for financing fees for street lighting;</li> <li>d) Increased awareness on devices for productive uses of electricity in project target villages.</li> </ul> <p><u>Free market / sale of products:</u></p> <ul style="list-style-type: none"> <li>a) Women groups inform their members and friends about conditions and benefits of different solar off-grid solutions for households and small businesses;</li> </ul>	<p><u>ERIL sector / sale of energy services:</u></p> <ul style="list-style-type: none"> <li>a) Coordination amongst stakeholders in expansion planning for the national grid and off-grid electrification is improved. All stakeholders use the same referene system and keep data up to date;</li> <li>b) Government actors and donor groups are actively working towards introduction of SENELEC tariffs for mini-grid clients;</li> <li>c) ASER is using the advisory platform to promote lessons learnt in the sector;</li> <li>e) Up to 25 EnDev-supported mini-grids have been connected by SENELEC to the national grid, providing higher tier access to the clients.</li> <li>f) ASER and MPE will discuss proposed strategy on waste management in the PV sector with stakeholders in the sector (companies, donors, NGOs).</li> </ul> <p><u>Free market / sale of products:</u></p> <ul style="list-style-type: none"> <li>a) PayGo companies use a Credit Reference System to reduce risk of low payments and high dropout rates.</li> <li>b) ASER and MPE will discuss proposed strategy on waste management in the PV sector with stakeholders in the sector (companies, donors, NGOs).</li> </ul>
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## Key interventions

### **Training, business development, hardware:**

- a) Introduction of more durable components in mini-grids to reduce the need for maintenance and replacement (e.g. Li-batteries) from suppliers in Senegal;
- b) Introduction of a digital payment system for electricity fees (e.g. prepaid smart meters, mobile money kiosks);
- c) Professionalisation of the village based caretakers (a.o. work contracts, remote guidance system for maintenance tasks per smartphone, performance-based incentive system) in collaboration with the operators;
- d) Professionalisation of mini-grid operators and their agents (BDS training, technical training);
- e) Facilitation of a framework agreement between ASER and operators for the management of the ERIL equipment;
- f) Facilitate business collaboration between suppliers of PUE devices and operators of mini-grids as a distribution system for PUE equipment;
- g) Providing BDS advice and/or training to PayGo agents as required;
- h) Piloting a new mini-grid concept that is able to meet current and future community energy needs with special focus on PUE development;

### **Awareness raising and marketing:**

- a) Support ASER and operators in 'village client dialogue sessions' on tariff harmonization, service quality, new payment systems etc.;
- b) Support ASER in creating awareness on PUE technology opportunities in EnDev ERIL;
- c) Use EnDev/GCF contact to 8,000 women groups for sensitisation and promotion of PV products (linking interested groups to suppliers);

### **Access to finance:**

- a) RBF ERIL Resilience Fund (potentially, if more funding is granted): Promoting maintenance and improvement of service by RBF incentives in collaboration with ASER and providing technical advisory for proposals (Exemplary eligible measures: Remote monitoring, smart regulators/meters, durable batteries, extending capacities, etc.);
- b) Piloting a new approach for social institutions accessing funds to pay for access to electricity (in collaboration with GBE/GIZ);
- c) Supporting ASER in the implementation of a revolving fund for PUE technologies;
- d) Advising and potentially collaborating with new PADERAU program of EU in implementing a RBF approach for PayGo solar products;
- e) Support development and piloting of a Credit Reference System for PayGo companies to verify solvency of potential clients;
- f) Supporting GBE/GIZ in facilitating access to finance for PayGo companies (particularly in the PUE sector);
- g) Facilitating women groups to use their traditional group financing system ("tontine") also for PV products (if found adequate);

### **Evidence, learning transfer and innovation:**

- a) Documenting lessons learnt from new technical mini-grid concepts and new operation models (including digitalization) as well as PUE interventions;
- b) Advising the new EU PADERAU Program on EnDev lessons learnt during concept development (and potentially implementation): RBF approaches, Innovations for mini-grids
- c) Supporting ASER in the creation of an advisory platform for mini-grids for sharing lessons learnt with interested partners in the sector

including PUE learnings;  
 d) Reaching out to other stakeholders in the PayGo subsector for better knowledge of their lessons learnt including PUE;

**Policy advice and capacity development:**

- a) Development and introduction of a geospatial tool for national electrification planning;
- b) Continuation of lobbying for the signing of the (already developed) contracts for mini-grid operators;
- c) Supporting PED/GIZ in the development of a strategy for the treatment of waste in the PV-sector of Senegal

**Partnerships and alliances:**

- a) Supporting SENELEC in managing the concessions with EnDev mini-grids (including facilitation of a smooth connection of 20 EnDev mini-grids to the national grid);
- b) Advising (on EnDev lessons learnt) and potentially collaborating in the implementation of the upcoming large PADERAU programme of EU on rural electrification;
- c) Support PED/GIZ programme in lobbying for the full implementation of the tariff harmonization (also in the donor group);
- d) Collaboration with Plan International in the promotion of PUE in villages electrified with support of EnDev.

Barriers	Supply side barriers	Demand side barriers	Enabling environment barriers
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	<p><u>ERIL sector / sale of energy services:</u></p> <p>a) Capacities of some operators to effectively manage the off-grid power supply infrastructure are still limited;</p> <p>b) The management system is dependent on frequent visits of operator staff in the villages (repairs, collection of fees, etc.);</p> <p>c) Operators face difficulties in sourcing certain spare parts;</p> <p>d) Operators and/or ASER do not systematically promote the use of devices for commercial activities to the clients in their mini-grids and standalone systems. Old ERIL concept did not provide capacity for larger PUE;</p> <p>e) Operators have very limited liquidity for investments;</p> <p>f) The management of the mini-grids by the village based caretakers is not very effective (lack of capacity and motivation);</p> <p>g) ASER does not very actively support and control the operators for ensuring an effective management of the mini-grids and SHS.</p>	<p><u>ERIL sector / sale of energy services:</u></p> <p>a) Clients of mini-grid electricity are increasingly dissatisfied with decreasing service quality and high tariffs compared to SENELEC;</p> <p>b) recent problems with payments of electricity fee (low liquidity due to COVID-19);</p> <p>c) social institutions in rural villages have no budget for paying electricity bills;</p> <p>d) communities do not pay for street lighting;</p> <p>e) low awareness on devices for productive uses of electricity.</p>	<p><u>ERIL sector / sale of energy services:</u></p> <p>a) Lack of coordination amongst stakeholders in expansion planning of the national grid and off-grid electrification;</p> <p>b) incomplete implementation of tariff harmonization at national level (including funding problem for compensation payments);</p> <p>c) Continued non-official status of operators of mini-grids (contracts still not signed);</p> <p>d) ASER is not adequately informing donors and projects of new (ODA) investments into off-grid power supply infrastructure about lessons learnt in the sector (e.g. from EnDev pilots);</p> <p>e) SENELEC has been allocated 4 concessions and is planning to connect many existing mini-grids to the national grid.</p> <p>f) There is no general strategy how the national PV sector could treat e-waste in an environmentally acceptable way.</p>
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	<p><u>Free market / sale of products:</u></p> <p>a) Technicians have to travel long distances in remote rural areas for serving few clients with installation of new devices or providing after sales services;</p> <p>b) Suppliers use their own limited liquidity for importation and prefinancing of systems for their clients;</p> <p>c) The repayment of systems is slow and there is a significant dropout rate.</p>	<p><u>Free market / sale of products:</u></p> <p>a) lack of awareness and/or trust in solar off-grid solutions for households and small businesses;</p> <p>b) low purchasing power and/or payment discipline.</p>	<p><u>Free market / sale of products:</u></p> <p>a) PayGo companies have difficulties to assess if their applicants are solvent or not.</p> <p>b) There is no general strategy how the national PV sector could treat e-waste in an environmentally acceptable way.</p>
<b>Assumptions</b>	<p>a) Clients would have the money to pay their fee, it is just that they refuse to pay and not a poverty problem;</p> <p>b) Operators reinvest their income from the collected fees into their ERILs;</p> <p>c) Village caretakers could in principle play an important role in the management of the mini-grids;</p> <p>d) The rural population is in principle interested in an commercial access to electricity services or products;</p> <p>e) The selection of villages for rural electrification is based on a planning process; Stakeholders would in principle like to avoid overlapping plans;</p> <p>f) New investors into rural off-grid electrification are in principle interested to benefit from lessons learnt in the sector;</p> <p>g) Agents of PayGo companies would like to screen their potential clients for solvency before signing contracts.</p>		
<b>Root causes</b>	<p>a) Clients of existing mini-grids are increasingly reducing or refusing payment of fees (because of the quality and conditions of the service they receive). Operators and their caretakers are reluctant to enforce good consumer behaviour (i.e. full payment of bills, energy saving measures, penalising fraud etc.);</p> <p>b) Operators are increasingly worried about the security of their investments into maintaining and repairing their mini-grids / SHS and the viability of their business (payment levels, social acceptance of the fees, expansion of the national grid, lack of valid contracts);</p> <p>c) The current operation model for ERIL installations (mini-grids and SHS) is highly vulnerable to external shocks;</p> <p>d) Operators have low income from electricity use during day time (e.g. from small enterprises);</p> <p>e) New (ODA financed) investments in off-grid electrification often replicate old approaches (with known weaknesses) or reinvent innovations that have already been tested;</p> <p>f) The suppliers of solar PV products (both domestic use and commercial applications) are increasing their annual sales volume and their geographic coverage (including density of sales points) rather slowly.</p> <p>g) stakeholders in the PV-sector do not treat waste in the PV sector safely.</p>		



<b>Assumptions</b>	<p>a) If tariffs and service quality are acceptable, rural households are prepared to stay connected and pay their fees to operators (it is NOT a political conflict in disguise);</p> <p>b) If conditions are right, operators in the ERIL have a viable business case and would maintain current level of connected households as well as invest into connecting additional clients;</p> <p>c) External shocks have occurred in 2020 (COVID-19);</p> <p>d) There are economic viable opportunities for the use of electricity in small enterprises in off-grid remote rural villages.</p>		
<b>Core problem</b>	<p><b>Access to modern energy services and products for households, small enterprises and social institutions in remote rural areas in Senegal is growing slower than anticipated (both in ERIL as well as in the free market).</b></p>		
<b>Impacts of the core problem at target group level</b>	<p><b>Social development:</b></p> <p>a) low increase of household income from use of electricity for productive activities;</p> <p>b) use of electricity in social institutions (e.g. health posts, schools) is vulnerable due to non-payment of electricity bills;</p> <p>c) women have only a small role in households' decisions on access to electricity.</p>	<p><b>Economic development:</b></p> <p>a) low diversity of electricity use for income generating activities;</p> <p>b) only few and mostly small private investments in PUE (mill, freezer, welding machine, etc.).</p>	<p><b>Combating climate change:</b></p> <p>No significance for this component</p>
<b>Impacts of the core problem at national level</b>	<p>Current speed of growth in rural electrification is insufficient to meet national (and international) targets</p>		

## Cooking Energy

### State of the market of PUE technologies (fish processing)

A baseline study on artisanal fish-processing revealed that this sector has a high relevance in terms of numbers (2014: > 17.000 artisanal fish processors; ANDS 2015) as well as gender (approx. 75% female processors amongst the interviewees). Fish-processors are organised in groups and associations at local and national level.

Smoking is the most prevalent method of processing fresh fish in Senegal. About 50% of the interviewed processors use an "improved traditional" fish-smoking technology. However, these devices have no standards and no significant efficiency gain. The other half of the fish-processors still use either very rudimentary technologies or even open fires on the beach. This means that **several thousand (mostly female) artisanal fish processors in Senegal have no access to efficient/convenient/modern fish processing technology (core problem)** because there is no real technology and therefore also no market for efficient fish-smoking technologies yet available in Senegal (root cause).

The barriers responsible for this situation are manifold:

On the supply side, (1) most existing so called "improved" fish-processing technologies are not really efficient nor convenient to use, (2) some more efficient fish-processing technologies are not commercially available, and (3) there is currently no technology development on efficient fish-processing technologies ongoing.

On the demand side, (1) the few commercially available improved technologies were not bought at scale, (2) the purchase power of artisanal fish-processors is limited, (3) there is limited access to consumer finance to overcome investment barriers, and (4) current "improved" fish-processing technologies are not fully adopted and used even if they are installed and available. In some cases, they were even destroyed by the fish-processors as they were perceived useless and occupied scarce space at the processing site.

The enabling environment also provides some barriers as artisanal fish-processing (in contrast to artisanal fishing) is a widely overlooked subsector with only few actors and little government attention. However, it is an asset that there are 3 associations at national level representing the artisanal fish processors.

Considering the barriers, root cause and core problem, the profitability of fish processing is low due to (a) high production costs (fish, fuel), (b) high fish losses during processing and distribution, (c) low quality of processed fish (=low sales price) and high workload on long processing time (resulting in low turnover). The mostly female fish processors therefore have a low and decreasing income and are exposed to high emissions and safety risks. Because of the wasteful processing technology, the availability of nutrients from fish for the population is small compared to the potential of the raw fish arriving on the beach. For the combat against climate change, the use of the rudimentary technologies results in high emissions to produce heat and smoke and therefore high overall GHG emissions per kg of processed fish, as well as in deforestation. Although this subsector is not considered in the NDC, it is still contributing to the national GHG emissions.

Besides fish-processing technologies, there are also traditional bakeries that consume a lot of firewood. The market situation for improved bakeries is not described in this document as the baseline study will only be implemented in 2021.

## Theory of Change - EnDev [Senegal: Cooking Energy/PUE - fish-processing]

<b>Indirect impacts at national level</b>	<b>GHG emissions of the sector are reduced and considered in the NDC targets</b>		
<b>Indirect impacts at target group level</b>	<b>Energising Lives - Social development</b> a) income of (predominantly female) fish-processors is increasing; b) exposure to emissions and safety risks for (mainly female) fish-processors is reducing; c) improved availability and accessibility of highly nutritious fish products for the population of Senegal.	<b>Energising Opportunities - Economic development</b> Business of fish processors is improving: a) reduced production costs (fuel); b) reduced fish losses during processing and distribution; c) increased quality of processed fish (=potentially a higher sales price); d) reduced work-load and processing time (=higher turnover).	<b>Energising Climate - Combating climate change</b> a) reduced emission for heat production; b) reduced emission for smoke production; c) less overall emissions per kg fish processed; d) reduced impact on deforestation.
<b>Direct impact</b>	<b>Enhanced adoption rate of efficient fish processing technologies amongst artisanal fish processors in selected (vision: all) fish processing beaches of Senegal</b>		
<b>Assumptions</b>	a) The private sector (fish processors, groups, associations) continues to promote, purchase, use, maintain and replace efficient fish-processing technologies; b) Producers of efficient fish-processing technologies reinvest their profits for the expansion of their business (production capacity, distributions network, marketing...); c) Governmental and non-governmental stakeholders support the development of the subsector through public awareness raising, ( <u>vision</u> : climate target setting and the introduction of regulations).		
<b>Outcome</b>	An increasing number of artisanal fish-processors gain access to professionalized, commercial, growing markets of affordable, convenient and efficient fish-processing technologies and related financing opportunities.		

<b>Assumptions</b>	<ul style="list-style-type: none"> <li>a) No government resolution is abolishing the artisanal fish processing;</li> <li>b) The industrial fish processing sector will not take over all fish arriving on the beaches in Senegal;</li> <li>c) The fishing sector will continue to supply similar quantities of fish to the sector;</li> <li>d) Demand for locally processed fish is not reducing damatically.</li> </ul>
<b>Outputs and re- sults</b>	<ul style="list-style-type: none"> <li>a) A number of well-qualified suppliers offer access to efficient fish-processing technologies in selected (<u>vision</u>: all relevant) fish processing beaches;</li> <li>b) Associations and groups of fish-processors in Senegal actively promote the purchase and use of efficient fish-processing technologies amongst their members and beyond. Some even use their tontine system for financing of the investment of their members;</li> <li>c) Finance institutions become increasingly aware of the business opportunities both for the supplier as well as of the customers of the efficient fish-processing technology;</li> <li>d) A divers range of a growing number of interested stakeholders supports the development of the subsector, and is increasing the interconnections to other related subsectors;</li> </ul>
<b>Key interventions</b>	<p><b>Training, business developement, hardware:</b></p> <ul style="list-style-type: none"> <li>a) Introduction and adaptation of efficient fish-processing technology developed by EnDev in Malawi including participatory processes for baseline assessments and innovation validation processes;</li> <li>b) Development of technical specifications and guidelines for the efficient fish-processing technology;</li> <li>c) Identification of producers for efficient fish-processing technology;</li> <li>d) Support for identified producers: training (production, marketing, distribution, business skills, finance sector...) , investment support, quality control, monitoring of supply chain.</li> </ul>
	<p><b>Awareness raising and marketing:</b></p> <ul style="list-style-type: none"> <li>a) working with national associations, local associations and groups to create awareness on efficient fish-processing technologies;</li> <li>b) use of local media (e.g. local radio) to promote <u>higher quality of processed fish</u> as a benefit and selling point for users of efficient fish-processing technologies;</li> </ul>
	<p><b>Access to finance:</b></p> <ul style="list-style-type: none"> <li>a) mainstreaming of efficient fish-processing technologies into traditional "tontine" saving group approaches of GIEs or local associations;</li> <li>b) sensitising the financial sector about financing opportunities (e.g. with buisness plans, financial models, IRR calculations etc.) in the fish processing sector;</li> </ul>

	<p><b>Evidence, learning transfer and innovation:</b>  a) Piloting, data collection and analysis;  b) Documentation of lessons learnt;  c) Data sharing with universities, ministries, interested projects and NGOs;</p>		
	<p><b>Policy advice and capacity development:</b>  a) supporting NDA to assess relevance of this subsector for national emission targets and policies;  b) training 3 national associations on fish-processing technologies;  c) developing technical guidelines for fish-processing devices that could eventually become a standard;</p>		
	<p><b>Partnerships and Alliances:</b>  a) working with the direct target groups (artisanal fish-processors), their groups (GIEs), their local (= transformation sites) associations and their 3 national associations;  b) developing an "exchange format" with NGOs, projects and government partners active in the field of artisanal fishing or fish processing or mangrove forest conservation;  c) supporting local associations of fish processors in improving the infrastructure of the fish-processing sites.</p>		
<b>Barriers</b>	<p><b>Supply side barriers</b>  a) most existing so called "improved" fish-processing technologies are neither really efficient nor convenient to use;  b) some existing "improved" fish-processing technologies are not commercially available;  c) there is currently no technology development on efficient fish-processing technologies ongoing;</p>	<p><b>Demand side barriers</b>  a) commercially available improved technologies were not bought at scale;  b) low purchase power of artisanal fish-processors;  c) limited access to consumer finance;  d) current "improved" fish-processing technologies are not fully adopted and used even if they are installed and available. In some cases they were even destroyed by the fish-processors as they were perceived useless and occupied scarce space at the processing site;</p>	<p><b>Enabling environment barriers</b>  Artisanal fish-PROCESSING is a widely overlooked subsector with only few actors and little governmental attention. There is some level of private setor organisation (3 National Associations of artisanal fish processors) though.</p>
<b>Assumptions</b>	<p>a) No suppliers of imported fish-processing technologies appear;  b) No project or government initiative start handing out free fish processing technologies at larger scale;</p>		

<b>Root cause</b>	No/low market (growth) of efficient/convenient/modern fish processing technologies on artisanal level		
<b>Assumptions</b>	Traditional fish-processors continue their business;		
<b>Core problem</b>	<b>Several thousand (predominantly female) artisanal fish processors in Senegal have no access to efficient/convenient/modern fish processing technology</b>		
<b>Impacts of the core problem at target group level</b>	<b>Social development:</b> a) income of (predominantly female) fish-processors is decreasing; b) high exposure of (mainly female) fish-processors to emissions and safety risks; c) decreasing availability and accessibility of nutritious fish products for the population of Senegal.	<b>Economic development:</b> Profitability of fish processing is low: a) high production costs (fish, fuel); b) high fish losses during processing and distribution; c) low quality of processed fish (=low sales price); d) high work-load and long processing time (=low turnover).	<b>Combating climate change:</b> a) high emission for heat production (partially from non-renewable sources); b) high emission for smoke productions (partially from non-renewable sources); c) high overall emissions per kg fish processed; d) impact on deforestation.
<b>Impacts of the core problem at national level</b>	Sector is increasing the national GHG emissions (though not part of the NDC targets)		

## Theory of Change - EnDev [Senegal: Cooking Energy/PUE - fish-processing]

<b>Indirect impacts at national level</b>	<b>GHG emissions of the sector are reduced and considered in the NDC targets</b>		
<b>Indirect impacts at target group level</b>	<b>Energising Lives - Social development</b> a) income of (predominantly female) fish-processors is increasing; b) exposure to emissions and safety risks for (mainly female) fish-processors is reducing; c) improved availability and accessibility of highly nutritious fish products for the population of Senegal.	<b>Energising Opportunities - Economic development</b> Business of fish processors is improving: a) reduced production costs (fuel); b) reduced fish losses during processing and distribution; c) increased quality of processed fish (=potentially a higher sales price); d) reduced work-load and processing time (=higher turnover).	<b>Energising Climate - Combating climate change</b> a) reduced emission for heat production; b) reduced emission for smoke production; c) less overall emissions per kg fish processed; d) reduced impact on deforestation.
<b>Direct impact</b>	<b>Enhanced adoption rate of efficient fish processing technologies amongst artisanal fish processors in selected (vision: all) fish processing beaches of Senegal</b>		
<b>Assumptions</b>	a) The private sector (fish processors, groups, associations) continues to promote, purchase, use, maintain and replace efficient fish-processing technologies; b) Producers of efficient fish-processing technologies reinvest their profits for the expansion of their business (production capacity, distributions network, marketing...); c) Governmental and non-governmental stakeholders support the development of the subsector through public awareness raising, ( <u>vision</u> : climate target setting and the introduction of regulations).		
<b>Outcome</b>	An increasing number of artisanal fish-processors gain access to professionalized, commercial, growing markets of affordable, convenient and efficient fish-processing technologies and related financing opportunities.		



<b>Assumptions</b>	<ul style="list-style-type: none"> <li>a) No government resolution is abolishing the artisanal fish processing;</li> <li>b) The industrial fish processing sector will not take over all fish arriving on the beaches in Senegal;</li> <li>c) The fishing sector will continue to supply similar quantities of fish to the sector;</li> <li>d) Demand for locally processed fish is not reducing damatically.</li> </ul>
<b>Outputs and re- sults</b>	<ul style="list-style-type: none"> <li>a) A number of well-qualified suppliers offer access to efficient fish-processing technologies in selected (<u>vision</u>: all relevant) fish processing beaches;</li> <li>b) Associations and groups of fish-processors in Senegal actively promote the purchase and use of efficient fish-processing technologies amongst their members and beyond. Some even use their tontine system for financing of the investment of their members;</li> <li>c) Finance institutions become increasingly aware of the business opportunities both for the supplier as well as of the customers of the efficient fish-processing technology;</li> <li>d) A divers range of a growing number of interested stakeholders supports the development of the subsector, and is increasing the interconnections to other related subsectors;</li> </ul>
<b>Key interventions</b>	<p><b>Training, business developement, hardware:</b></p> <ul style="list-style-type: none"> <li>a) Introduction and adaptation of efficient fish-processing technology developed by EnDev in Malawi including participatory processes for baseline assessments and innovation validation processes;</li> <li>b) Development of technical specifications and guidelines for the efficient fish-processing technology;</li> <li>c) Identification of producers for efficient fish-processing technology;</li> <li>d) Support for identified producers: training (production, marketing, distribution, business skills, finance sector...) , investment support, quality control, monitoring of supply chain.</li> </ul>
	<p><b>Awareness raising and marketing:</b></p> <ul style="list-style-type: none"> <li>a) working with national associations, local associations and groups to create awareness on efficient fish-processing technologies;</li> <li>b) use of local media (e.g. local radio) to promote <u>higher quality of processed fish</u> as a benefit and selling point for users of efficient fish-processing technologies;</li> </ul>
	<p><b>Access to finance:</b></p> <ul style="list-style-type: none"> <li>a) mainstreaming of efficient fish-processing technologies into traditional "tontine" saving group approaches of GIEs or local associations;</li> <li>b) sensitising the financial sector about financing opportunities (e.g. with buisness plans, financial models, IRR calculations etc.) in the fish processing sector;</li> </ul>

	<p><b>Evidence, learning transfer and innovation:</b>  a) Piloting, data collection and analysis;  b) Documentation of lessons learnt;  c) Data sharing with universities, ministries, interested projects and NGOs;</p> <p><b>Policy advice and capacity development:</b>  a) supporting NDA to assess relevance of this subsector for national emission targets and policies;  b) training 3 national associations on fish-processing technologies;  c) developing technical guidelines for fish-processing devices that could eventually become a standard;</p> <p><b>Partnerships and Alliances:</b>  a) working with the direct target groups (artisanal fish-processors), their groups (GIEs), their local (= transformation sites) associations and their 3 national associations;  b) developing an "exchange format" with NGOs, projects and government partners active in the field of artisanal fishing or fish processing or mangrove forest conservation;  c) supporting local associations of fish processors in improving the infrastructure of the fish-processing sites.</p>		
<b>Barriers</b>	<p><b>Supply side barriers</b>  a) most existing so called "improved" fish-processing technologies are neither really efficient nor convenient to use;  b) some existing "improved" fish-processing technologies are not commercially available;  c) there is currently no technology development on efficient fish-processing technologies ongoing;</p>	<p><b>Demand side barriers</b>  a) commercially available improved technologies were not bought at scale;  b) low purchase power of artisanal fish-processors;  c) limited access to consumer finance;  d) current "improved" fish-processing technologies are not fully adopted and used even if they are installed and available. In some cases they were even destroyed by the fish-processors as they were perceived useless and occupied scarce space at the processing site;</p>	<p><b>Enabling environment barriers</b>  Artisanal fish-PROCESSING is a widely overlooked subsector with only few actors and little governmental attention.  There is some level of private sector organisation (3 National Associations of artisanal fish processors) though.</p>
<b>Assumptions</b>	<p>a) No suppliers of imported fish-processing technologies appear;  b) No project or government initiative start handing out free fish processing technologies at larger scale;</p>		

<b>Root cause</b>	No/low market (growth) of efficient/convenient/modern fish processing technologies on artisanal level		
<b>Assumptions</b>	Traditional fish-processors continue their business;		
<b>Core problem</b>	<b>Several thousand (predominantly female) artisanal fish processors in Senegal have no access to efficient/convenient/modern fish processing technology</b>		
<b>Impacts of the core problem at target group level</b>	<b>Social development:</b> a) income of (predominantly female) fish-processors is decreasing; b) high exposure of (mainly female) fish-processors to emissions and safety risks; c) decreasing availability and accessibility of nutritious fish products for the population of Senegal.	<b>Economic development:</b> Profitability of fish processing is low: a) high production costs (fish, fuel); b) high fish losses during processing and distribution; c) low quality of processed fish (=low sales price); d) high work-load and long processing time (=low turnover).	<b>Combating climate change:</b> a) high emission for heat production (partially from non-renewable sources); b) high emission for smoke productions (partially from non-renewable sources); c) high overall emissions per kg fish processed; d) impact on deforestation.
<b>Impacts of the core problem at national level</b>	Sector is increasing the national GHG emissions (though not part of the NDC targets)		

### 1.16.3 Transformative character

#### Rural Electrification

In this phase, EnDev will support operators of ERIL systems to install – at a small scale - technical solutions that allow them to operate their ERIL more efficiently and more sustainably. Based on the learnings from this piloting at the end of this phase, operators and donors of the sector in Senegal will take up these concepts for application at larger scale through ODA and/or private investments. The extend and success of this transformation is also influenced by the implementation of the tariff-harmonization.

#### Market development

The development of Mini-grids (and the SHS-fee for service approach under the ERIL) is not a free market approach. It is a process under ODA financing and the guidance of the rural electrification Agency (ASER) and other government entities.

The situation is very different in the sub-sector of individual systems sold on the free market. PayGo companies are accessing new clients and new markets in rural areas on their own initiative and cost. However, they find it expensive because of the high transaction costs per unit sold.

Access to finance has been mentioned as the major bottleneck for the growth by the PayGo companies. In collaboration between EnDev and the GBE project, the stakeholder of the finance sector and project developers will identify the business opportunities and increase their collaboration. This will allow PayGo companies to increase the volume of their sales.

Inspired and informed by the pilot in EnDev Uganda, a Credit Reference System will help them to select reliable clients.

#### Economic development

The market for PUE devices will be developed both for the ERIL subsector as well as through the PayGO companies. In collaboration with Plan International, small enterprises in EnDev villages are made aware about opportunities to use electricity for improving their businesses (both (mini-)grid connected and standalone solutions). The Agency for Rural Electrification ASER will be supported to implement their own intervention of promoting PUE markets in the form of a revolving PUE fund, offering adapted (re)payment schemes to beneficiaries. This includes awareness activities for potential clients in EnDev target villages. For the supply side, a collaboration between suppliers of PUE equipment and the operators of ERILs as potential retailers will be facilitated.

#### Social development

Social institutions in rural Senegal rarely have a budget to purchase, operate and maintain RE-technology or to pay their electricity fee to a provider. In collaboration with the GBE project, new approaches are developed and tested to provide social institutions with income opportunities that will allow them to at least maintain and repair their RE systems or to pay for their electricity bill. This activity will remain at pilot level unless more funding is provided. By facilitating the link between selected women groups and PayGo companies, they become not only beneficiaries (investing into their own PV system), but also actors of the supply chain (as demand aggregator or even salesperson), contributing to their economic empowerment.

## Cooking Energy

### **PUE technologies (fish processing)**

Fish processing is an important economic activity in Senegal, both on industrial and artisanal level. The latter provides employment for thousands of mostly female small entrepreneurs who use rudimentary technologies (e.g. making fire on the bare sand), resulting in inefficient fuel use (= high costs), high post-harvest fish-losses (= low productivity), low product quality (= low selling price), slow production processes (= low turnover), and high pollution.

### **Market development**

The ambition of the project is to introduce a new type of technology and develop a dedicated sub-market for it. There is a similar market opportunity for replacing traditional bakeries that will be assessed and piloted during the implementation until December 2023.

### **Economic development**

Better technologies are available internationally but need to be introduced and adapted to the needs in Senegal. There is no tier system for this kind of technology to prove “higher tier access”. However, technical paradigm shifts can serve as a proxy-indicator for significant improvements like a ‘staged application of heat and smoke’, ‘confining the smoke in a cabinet’, ‘temperature control for improved product quality and reduction of PAH (polyaromatic hydrocarbons)’. The new technology is significantly reducing fuel requirements for heat generation, reducing fish losses during transformation, improving the quality of the product, and reducing processing time. This will boost the viability of the small businesses and allow for investments into growth.

### **Social development**

In the baseline study, 75% of the interviewees were female fish-processing entrepreneurs. Their income will increase and their exposure to smoke will be significantly reduced.

## **1.16.4 Collaboration**

### Rural Electrification

#### **Sector alignment**

When EnDev entered the sector of electrification in Senegal in 2006, the development of rural electrification was stagnant. The GoSN tendered only 6 out of 10 concessions, while four areas were left unserved. Some of the concession holders turned out not to invest much to connect more households. EnDev identified the development of ERIL (Rural Electrification based on Local Initiatives) as a high-potential approach to address the weaknesses of the sector. In strong collaboration with the Agency for Rural Electrification ASER, EnDev developed the technical concept for solar-hybrid mini-grids, installed the first 16 mini-grids in the country and electrified 55 villages by solar home systems until 2010. Based on this pioneering work, EnDev implemented an EU-co-funded scaling-up phase from 2010 to 2016. EnDev thereby filled the gap that was left by the dysfunctionality of rural electrification through the national grid. Recently, five major shifts in the sector occurred that lead to a reorientation of EnDev’s role in the sector: (1) The National Plans for rural electrification aim at universal access by 2025 with 95% access through the national grid. (2) Based on the exploitation of natural gas for power generation from 2023 onwards, the GoSN took measures to mobilise

all concessions to reach out faster to the population. (3) More donors have started to put money into building more mini-grids in Senegal (over 700 mini-grids under planning or construction) and more are to come e.g. by the Support Programme for the Development of Renewable Energies for Universal Access (PADERAU/EU) or an electrification project of up to 1,000 mini-grids elaborated by ASER in response to the national operational plan (GoSN with co-financing of the Green Climate Fund and the West African Development Bank). (4) EnDev discovered a larger number of challenges for the sustainability of mini-grids and SHS under the fee-for-service approach that need to be solved to ensure long-term benefits from investments. These challenges have been accelerated by the COVID-19 pandemic and the national lockdown of three months. In the build back of the ERIL systems, the resilience against shocks needs to be increased.

These four changes together resulted in the decision of EnDev to no longer invest into the establishment of additional mini-grids. Instead, EnDev is going back to its **pioneering role** in the subsector of rural electrification to provide and share solutions (1) on resilience and sustainability; (2) on digitalisation (smart meters, mobile money, surveillance of power stations, coaching for maintenance); (3) exploring options to support the growth of the market for individual pay-to-own PV systems; (4) Collaborating with Plan International, PED and GBE on the promotion of productive uses of energy.

### **Implementer base**

International donors are very active in Senegal's energy sector, both on-grid and off-grid. In the subsector of the concessions for the rural electrification through the national grid, there are six concessions which will be supported by one international donor each (World Bank [2], African Development Bank, Agence Française de Développement, Kreditanstalt für Wiederaufbau, European Union). The utility SENELEC will provide access to electricity to the remaining four concessions. Other donors and programs, such as the Millennium Challenge Account Senegal II, are active in the on-grid sector on national level.

In the subsector of mini-grids, there are several projects and donors involved in the construction of overall 720 mini grids: KfW/Gauff [300], West African Development Bank and Partners [188], UNDP (PUDC) [132], European Union [70], Abu Dhabi Project Fund with IRENA [30]. The EU is preparing the PADERAU-Program to support rural electrification at massive scale in the four new SENELEC concessions by grid extension and off-grid solutions.

With regards to the standalone PV subsector, the World Bank-funded Regional Off-Grid Electrification Project (ROGEP) targets solar lanterns, SHS, solar water pumping, and solar-driven agricultural processing by providing market intelligence for the private sector and financing (i.e. a debt fund directed at off-grid companies as well as direct grants), amongst others. The National Agency of Renewable Energies (ANER) is furthermore active in the field of standalone solar in social infrastructure, receiving support from the Dutch Embassy. Overall, regarding the supply of equity for early stage SHS companies, international investors have limited their presence in the region (compared to the markets in East Africa).

Productive use of energy by mini-grid and/or standalone solutions is in the focus of activities of various actors, including NGOs such as Plan International (e.g. project DESFERS) and Enda Energie (e.g. Progrès Lait), both under contribution of donors such as the EU. The governmental agencies ASER and ANER are both equally implementing PUE projects (e.g. UEMOA-funded installation of multifunctional solar platforms (ANER), multisectoral projects (PREMS/ASER)). Energy4Impact has worked with women groups for the promotion of PV

equipment in Senegal. The GBE is supporting the market development for PUE solutions (focus: rural cooperatives) and electrification of social institutions. GBE is collaborating with the DIAPOL-CE project (IKI/BMU) that is implemented by RENAC in terms of capacity development for “green financing” of investments for renewable energy in Senegal. The EnDev/GCF project will be working with up to 8,000 women groups (out of which app. 50 will be selected by EnDev for becoming actor in the supply chain of PV products). Réussir au Sénégal (Success in Senegal) increases employment opportunities for young people in Senegal based on renewable energies to reduce the attractiveness of migration to Europe.

The World Bank and the EU are major supporters of improving the enabling environment of the sector for rural electrification. This is also a focus of the work of the PED/GIZ program (e.g. with respect to the development of a strategy of waste treatment in the PV sector). The PESERE program is supporting the quality of higher education on renewable energy.

In the view of the above, EnDev is a small player in the electricity sector of Senegal. However, EnDev has a strong and long-term presence in the rural areas. The definition of EnDev’s role has been selected building on the special contribution that EnDev can bring to the table.

### **Leverage**

To increase the leverage, EnDev is looking at a double strategy: (1) supporting ASER to institutionalise the sharing of learnings through an advisory platform to indirectly influence new initiatives, and (2) advise interested actors bilaterally. One example is the new PADERAU program of the EU (long-term target: > 4,500 villages, including in EnDev’s intervention zone): Information on our technical concepts, implementation experiences and approaches (including RBF) have been shared and different options for future implication of EnDev have been discussed. In this context, EnDev will also support SENELEC to facilitate the smooth connection of approx. 20 mini-grids to the national grid.

EnDev is already working with Plan International on the promotion of PUE in selected villages that were electrified with support of EnDev (project DESFERS) and is thereby joining the other donors European Union, OFID and the Schneider Electric Foundation. This collaboration will be continued and expanded. GBE/GIZ is developing new approaches on electrification of rural businesses and social institutions (including access to finance). EnDev will benefit from their experiences and will adopt their learnings where feasible.

In the German development cooperation in Senegal, PED/GIZ is the key talking partner for the Ministry of Petroleum and Energy (MPE). EnDev is benefitting from their investments to follow-up on tariff harmonization, contracts for operators, etc. EnDev is also sharing the costs of the strategy-development on solar waste management with PED.

### **Nexuses**

The promotion of productive uses of renewable energy in rural areas of Senegal will have impact on other sectors like agriculture (solar water pumping for irrigation, solar mills, cold chain) or the fish-business (solar ice production), water (solar water treatment systems), and health (solar drug cooling). The promotion of smart technologies, necessary infrastructure (i.e. mobile money kiosks), and sensibilisation may further support digital literacy and financial inclusion of the targeted rural populations.

### **Cooking Energy**



## **PUE technologies (fish processing)**

### **Sector alignment**

Fish processing is neglected by government regulations and policies. Because of the nexus-character of the topic, there is no dedicated stakeholder group to which EnDev could align.

### **Implementer base**

In the past, there have been some efforts by FAO and other actors to introduce more efficient technologies for artisanal fish-processing. Today, the three National Associations of artisanal fish processors (and their site-specific sub-associations) are the most important implementers to consider. However, there are also actors promoting the artisanal fishing sector and sustainable mangrove forest management that are relevant for the subsector.

### **Leverage**

EnDev will build up the market for modern fish processing technologies from a very low baseline level. In the beginning of the process, the potential for leverage will be small. Only after proof of the technical concept, user acceptance and viability of the business case, this innovation will be attractive for other stakeholders to invest into the growth of the market. In the medium term, support for this initiative is likely to be found amongst stakeholders supporting traditional fishing, (mangrove) forest protection, local economic development, etc.

### **Nexuses**

The development of a market for technologies that allow efficient/convenient/modern fish processing will have various positive impacts that can be attributed to different sectors: (a) the reduction of the fuel used per kg of processed fish is contributing to the protection of the environment; (b) the reduction of the loss of fish during processing is improving the income in the fishing sector, but also the amount of protein rich food for the population; (c) the improvement of the quality of processed fish is increasing the quality of food and the value of the product; (d) the reduction of smoke is reducing the personal exposure of the fish processor and the emissions to the atmosphere. Hence this intervention is directly supporting the nexus of the fishing sector, nutrition and food security, local economic development, forestry, energy, gender, environment, and health.

## **1.16.5 Modalities**

### **Rural Electrification**

The project will contribute to an overall acceleration of growth of access to modern energy services and products for households, social institutions and small enterprises in remote rural areas in Senegal (**direct impact**) and thus help the government in achieving their objective of universal access (though 2025 might be too ambitious).

These impacts will be based on the following **outcomes** and related outputs from the key interventions of the project (see also the ToC on Rural Electrification):

#### The ERIL subsector

- a) **An increasing number of satisfied clients of mini-grids use mobile money payments for timely recharging their prepaid, kWh-based meter. They willingly apply**

**efficient devices and practices. The relationship with the service provider is improved.**

This outcome is foremost dependent on the government to make the necessary provisions to fully implement the harmonization of tariffs in the ERIL. In the light of the COVID-19 pandemic with its impact on the economy and government spending, it is hard to judge when government will complete the implementation of the harmonization at ERIL level. The outcome also depends on the economic recovery to increase liquidity of rural households. The lower tariffs and improved liquidity of the clients is complemented by an improved service quality based on the gradually improving capacities of ERIL operators to effectively manage the off-grid power supply infrastructure (Output).

- b) **ERIL operators are encouraged by an increased institutional (contract), social (client satisfaction), technical (maintenance and repair) and economic (income/ viability) security of their investments. They better understand how to operate their ERIL as a business and work with more professional service providers up to village level. ASER is helping them to ensure professional management of the assets under their ERIL.**

This outcome is dependent on the government to make the necessary provisions to sign the contracts of the operators. It also depends on the economic recovery to increase the liquidity of rural households. The emergence of the COVID-19 crises is making it hard to predict when GoSN will be in the position to make the necessary provisions. However, access to energy is a central topic for the current government and the development plan of the country.

- The following outputs on the supply side are contributing to this outcome:  
(1) Capacities of ERIL operators to effectively manage the off-grid power supply infrastructure is increasing over time; (2) Increased liquidity of ERIL operators for investments; (3) The village-based caretakers are increasingly improving the effectiveness of their mini-grid management; (4) ASER and the ERIL operators develop an effective management system for the mini-grids.
- The following outputs on the demand side are contributing to this outcome:  
(1) Clients of mini-grid electricity are increasingly satisfied with improving service quality; (2) Pilots successfully demonstrate that SI can generate sufficient income to pay for electricity fees; (3) Pilot communities successfully test approaches to generate funds for financing fees for street lighting.
- The following outputs on the enabling environment are contributing to this outcome:  
(1) Coordination amongst stakeholders in expansion planning of the national grid and off-grid electrification is improved. All stakeholders use the same reference system and keep data up to date; (2) Government actors and donor groups are actively working towards introduction of SENELEC tariffs for mini-grid clients; (3) It is unavoidable that mini-grids will be connected to the national grid. This will bring higher tier access to the clients. However, confidence of operators is built on predictability and a smooth facilitation of the transition (25 EnDev-supported mini-grids will be connected by SENELEC to the national grid with support of EnDev).

- c) **The new operation model supported by digital formats is reducing the role of on-site visits in addressing larger technical problems, which are detected faster based on remote data management of the systems. The maintenance is more**

**resilient by the use of more durable components that can be sourced within the country.**

This improvement is an outcome of the following results: (1) Capacities of ERIL operators to effectively manage the off-grid power supply infrastructure are increasing over time; (2) Gradually, the frequency of visits of operator staff in the villages can be reduced; (3) Components in new mini-grid concepts are based on local procurement; (4) The village-based caretakers are increasingly improving the effectiveness of their mini-grid management (supported by digital formats); (5) Increased liquidity of ERIL operators for investments into repair and maintenance, and (6) ASER and the ERIL operators develop an effective management system for the mini-grids.

**d) An increasing number of small enterprises in the ERIL pay for electricity use during day time. First social institutions start paying for the electricity they consume.**

This improvement is an outcome of the following results: (1) Operators and ASER play different active roles in the promotion of PUE in mini-grids. The new concepts of ERIL provides an increased capacity for PUE; (2) Pilots successfully demonstrate that SI can generate sufficient income to pay for electricity fees; (3) Pilot communities successfully test approaches to generate funds for financing fees for street lighting; (4) Increased awareness on devices for productive uses of electricity in project target villages.

**e) ASER is actively informing new (ODA financed) investors (in off-grid electrification) about the institutional knowledge documented on the mini-grid advisory platform. EnDev serves as advisor for further questions. The new EU program PADERAU is considering the advice of EnDev in their planning and implementation (and potentially using EnDev as a collaborator).**

ASER is taking a more active role in sharing the learnings of the sector by using the new advisory platform. This also supports more systematically EnDev's increased efforts of sharing information with other stakeholders bilaterally.

### The PayGo market

**(PayGo) companies increase their investments into sales volume and densification of services in the intervention zones of EnDev and beyond (outcome).**

This is caused by the following outputs: (1) Over time, the density of clients in the target region increases, reducing the distances between the sites where services have to be delivered; (2) Suppliers gain additional access to commercial financing opportunities to complement their own limited liquidity for importation and prefinancing of systems for their clients; (3) The repayment rate of systems is improving, while the dropout rate is reducing; (4) Women groups inform their members and friends about conditions and benefits of different solar off-grid solutions for households and small businesses and (5) PayGo companies use a Credit Reference System to reduce risk of low payments and high drop-out rates.

### The PV sector overall

**Stakeholders in the sector start applying recommended measures to avoid or treat safely waste in the PV sector.**

MPE and its agency ASER will be using the e-waste strategy (supported by EnDev) to facilitate discussions on waste treatment in the PV sector with the stakeholders of the sector (e.g. private sector, the donors, the NGOs). EnDev will provide learning examples by piloting the

use of recommended solutions (e.g. use of Li-batteries) for better assessment based on data and on-site visits.

The approaches on rural electrification to achieve the above-mentioned outcomes and outputs are structured into **five components**:

- I. **“Build back better” the operator-based energy supply systems (mini-grids, SHS) in the ERIL;**
- II. **Foster market-based access for stand-alone solar solutions through PayGo companies;**
- III. **Support market development for PUE devices in both submarkets (ERIL and PayGo);**
- IV. **Increase transfer of learnings in the sector both institutionally (ASER) and bilaterally;**
- V. **Support coordination and collaboration in the sector of rural electrification.**

For each of these components, the four aspects of this chapter (approach, activities, reason for approach and effectiveness) are described in separate sections. Within these **five components**, the activities are structured by **key interventions** as found in the ToC. The number of the activities (e.g. “(a)”) is referring to the number in the ToC under the respective key intervention.

### **Component I: “Build back better” the operator-based energy supply systems (mini-grids, SHS) in the ERIL**

#### **Approach**

The old ERIL concept of EnDev contained weaknesses that contributed to the sustainability challenges that became evident in 2016. EnDev has developed a new concept in the past consolidation phase that is addressing these challenges, including digital formats (for remote management), more durable and low maintenance equipment (e.g. Li-batteries), and more capacities for higher-tier PUE access for mills, welders, etc.

In this phase, 1 of the 7 operators will be supported to upgrade 1 high-potential mini-grid according to the new concept. Plans to upgrade 1 mini-grid each for the other 6 operators are ready (and are pending until availability of additional funding).

However, some elements of the concept are not so expensive and will be applied in a larger number of ERIL systems (e.g. smart meters; mobile money kiosks; professionalisation of mini-grid caretakers including digitalisation; professionalisation of mini-grid operators, etc.).

Outlook: Based on the results of these 1-7 pilots, other donors shall be motivated to (a) integrate elements of this new concept into their planning and (b) invest into the upgrading of more high-potential EnDev mini-grids. An RBF-style intervention (“ERIL Resilience Fund”) shall be used to support operators in using their own increased income for investments in the application of the new features they have learned to appreciate in their pilot (funding permitting).

Complementary, the lobbying for the full introduction of the harmonization of the tariff at ERIL level and the signing of the contracts for the operators needs to be intensified in cooperation with other stakeholders.

## Activities

### Key intervention 1: Training, business development, hardware

- Introduction of more durable components in mini-grids to reduce the need for maintenance and replacement (e.g. Li-batteries) from suppliers in Senegal. This activity will only be piloted in 1 mini-grid unless more funding will be available. Activity b) to e) do not fall under this restriction. In 2016, an analysis on the sustainability of EnDev mini-grids revealed that technical durability has been limited by the fact that some of the original equipment was stemming from suppliers with no service point in Senegal (e.g. SMA equipment). The Senegalese Operators of mini-grids found it difficult or impossible to find service for it when required. Therefore, new equipment will be selected based on specifications of equipment that can be maintained and replaced easily within the territory of Senegal. The piloting of Li-batteries also serves as a learning opportunity on waste management in the PV-sector.
- Introduction of a digital payment system for electricity fees (e.g. prepaid smart meters, mobile money kiosks). This will also allow consumption-based payment by kWh, which is a precondition of the tariff-harmonization.
- Professionalisation of the village-based caretakers (e.g. work contracts, remote guidance system for maintenance tasks per smartphone, performance-based incentive system) in collaboration with the operators.
- Professionalisation of mini-grid operators and their agents (BDS training, technical training). This will be demand driven based on their specific requirements.
- Facilitation of a framework agreement between ASER and operators for the management of the ERIL equipment. The purpose is to further clarify roles and responsibilities and review if there are changes required due to the evolving sector environment.

### Key intervention 2: Awareness raising and marketing

- Supporting ASER and operators in 'village client dialogue sessions' on tariff harmonization, service quality, new payment systems, etc. Operators are facing difficulties explaining their clients why they are not yet benefitting from the lower SENELEC tariffs. They have requested ASER to help them in discussing the grievances with their clients. EnDev will support ASER and operators in the design of the process, the development of the communication formats and tools, and support partially (particularly at the beginning) also the implementation of the activities. However, the owner of the process will be ASER and the operators.

### Key intervention 3: Access to finance

- RBF ERIL Resilience Fund (potentially, if more funding is granted): Promoting maintenance and improvement of service by RBF incentives in collaboration with ASER and provide technical advisory for proposals (Exemplary eligible measures: remote monitoring, smart regulators/meters, durable batteries, extending capacities, etc.). The RBF Fund would assist operators to overcome the investment barriers and take the risk of investing. In the absence of this mechanism, it is likely that they will take more time analysing the impact of the measures in the pilot implementation to ensure that taking the risk for investing is worthwhile. However, integrating this activity into the next programming in 2 years will also be early enough to benefit from the learning of pilots in this phase.

#### **Key intervention 4: Evidence, learning transfer and innovation**

- Documenting lessons learnt from new technical mini-grid concepts and the new operation model (including digitalization). Based on the assessments of the sustainability challenges in 2016, EnDev will analyse the benefits of the new technical concept for a more sustainable future of the business model. This also applies on learnings regarding waste management in the PV sector (e.g. Li-batteries).

#### **Key intervention 5: Policy advice and capacity development**

- Continuation of lobbying for the signing of the (already developed) contracts for mini-grid operators). Together with the PED/GIZ programme, EnDev will continue to consult with other (larger) programs and donors active in the promotion of mini-grids in Senegal for advancing the signing of the contracts. However, it shall be noted that this is closely linked to the question of the harmonization of tariffs as the tariffs are mentioned in the contract.
- Supporting PED/GIZ in the development of a strategy for the treatment of waste in the PV-sector of Senegal.

#### **Key intervention 6: Partnerships and alliances**

- Supporting SENELEC in managing the concessions with EnDev mini-grids (including facilitation of a smooth connection of 20 EnDev mini-grids to the national grid). In this process, EnDev will facilitate exchanges between SENELEC and the operators of the respective mini-grids and ASER to promote a joint understanding on the transition to grid-based electricity, the future role of the operator (e.g. as service provider for high quality in-house installations, potentially supported by EnDev through a RBF-contract), the compensation, the options for using current installations financed by EnDev (e.g. low voltage line, PV-installations for feed-in, in-house installations of current clients).

#### **Reason for Approach**

The ERIL structures are property of the Government of Senegal (through ASER) and managed by the operators. There is some logic in leaving the resolution of the problems to these two actors who are responsible for assuring the sustainability of the investments of EnDev. However, the operators and ASER do not have the means in the middle of a crises that destroyed all liquidity for investing into the above changes. A zero-engagement-scenario would lead with no doubt to a long-term non-functioning of all mini-grids.

The selected approach is providing capacity development to all required actors of the operation system, thus creating the condition for future roll-out. The two-step approach of the hardware investments provides learning examples (proof of concept) to each of the operators (1 directly and 6 indirectly; unless more funding is provided) and to ASER.

In the second step (depending on additional funding in the future), own EnDev investments could leverage complementary financing from e.g. the EU or other donors. This is in line with EnDev's role as a pioneer in the sector in Senegal, leaving the scaling-up of successful innovations to partners with more funds.

An alternative approach could theoretically be the linking of operators to private sector financing. However, this can only happen after a comprehensive turn-around in the sector.

## **Effectiveness and Cost-Efficiency**

With regards to the access of households to electricity for domestic purposes like lighting or access to information, a mini-grid is not very cost-efficient. For this reason, EnDev Senegal has changed the set-up to provide higher tier access for PUE. Complementary, other approaches are taken up for standalone systems (see below).

## **Component II: Foster market-based access for standalone solar solutions through PayGo companies**

### **Approach**

PayGo companies are representing the largest share of the off-grid PV sector in Senegal. As they are providing consumer financing (if required), their offer is already addressing the problem of the investment barriers that other suppliers commonly meet. EnDev therefore performed interview with PayGo companies (which do not differ very much in terms of size of the outfit in Senegal) to better understand their limitation for growth and the needs for support that they perceive. In these interviews, some PayGo companies in the sector expressed their concerns about “projects” entering their market. They fear market distortion (e.g. free hand-outs”) and unnecessary disturbances of their work (including the participation in the very same interview). Still, they also shared concerns about their capacity to serve a large share of the market. Based on their feedback, the proposed activities address rather specific needs expressed by the private sector companies than a comprehensive, conclusive approach. Entering a new subsector, the EnDev Senegal team will also link up with other stakeholders in the subsector (including the GBE) to further improve understanding.

A new opportunity may be arising from the exchanges with the EU on their PADERAU project. There is interest in EnDev’s (global) experiences in RBF approaches and their potential application in the market of standalone devices in Senegal.

### **Activities**

#### **Key intervention 1: Training, business development, hardware**

- Providing BDS advice and/or training to PayGo agents as required. This will be demand driven and tailored based on individual demand of the PayGo companies.
- Note: there will be no hardware provided to the PayGo companies (it is just the standard header for this key intervention).

#### **Key intervention 2: Awareness raising and marketing**

- Use EnDev/GCF contact to 8,000 women groups for sensitisation and promotion of PV products (linking interested groups to suppliers). In the framework of sensibilisation on ICS products in the EnDev/GCF project, the awareness raising on pico-PV products will be integrated. Based on interest of groups and selection criteria, at least 50 women groups will be selected to become demand aggregator and retailer of pico-PV products in collaboration with PayGo companies. EnDev will consult with other actors like Energy4Impact that have relevant experiences with this approach in Senegal.

#### **Key intervention 3: Access to finance**

- Advising and potentially collaborating with new PADERAU program of EU in implementing an RBF approach for PayGo solar products. The EU has mentioned this as one of



their potential interests for GIZ to assist them in the implementation of the PADERAU project. However, discussions are still at a very early stage.

- Support development and piloting of a Credit Reference System for PayGo companies to verify solvency of potential clients. This activity is taking up experiences from EnDev Uganda where this approach has been piloted.
- Supporting GBE/GIZ in facilitating access to finance for PayGo companies (particularly in the PUE sector). This will be done in partnership with the project DIAPOL-CE (IKI/BMU) implemented by RENAC and is targeting to strengthen capacities for “green financing” of renewable energy investments through training of trainer, project developers and other stakeholders in the sector.
- Facilitating women groups to use their traditional group financing system ("tontine") also for PV products (if found adequate). The EnDev/GCF project will be working with 8,000 women groups in the country on ICS sensibilisation and marketing. Out of those, around 50 will be selected based on (amongst others) good track record, performance on ICS sales and interest in PV products for becoming demand aggregator and retail partners for PayGo companies. They will receive business training etc. in the framework of the EnDev/GCF Project, which will also be useful for the retailing of pico-PV products.

#### **Key intervention 4: Evidence, learning transfer and innovation**

- Reaching out to other stakeholders in the PayGo subsector for better knowledge of their lessons learnt. EnDev Senegal did not yet work much in the PayGo sector. Hence the project – together with the GBE – will learn more from other stakeholders through exchange formats.

#### **Key intervention 5: Policy advice and capacity development**

- Supporting PED/GIZ in the development of a strategy for the treatment of waste in the PV-sector of Senegal.

#### **Reason for Approach**

The PayGo companies insisted that they do not want “aid”-support (e.g. large number of free handouts to potential clients) to their market. Their main limitation is the slow growth as most of their capital is blocked in consumer financing. Hence, the focus of the intervention is in key intervention 3. In this context, EnDev can benefit from collaboration with four different partners:

- The EU expressed their interest in RBF experiences of EnDev (globally) as they were impressed with the results in other countries.
- The Credit Reference System is an EnDev learning from Uganda and Ethiopia.
- EnDev could also benefit from GBE work in the field of access to finance for PayGo companies.
- The EnDev/GCF programme will have access to 8,000 women groups and their tontine system for PV product promotion.

The approach is therefore partially the result of “harvesting opportunities”.

#### **Effectiveness and Cost-Efficiency**

As most of the activities will be implemented in collaboration with other partners, the actual cost for EnDev will be very limited.

## **Component III: Support market development for PUE devices in both submarkets (ERIL, PayGo)**

### **Approach**

The ERIL approach developed in the beginning of EnDev from 2006 onwards did not consider the needs for PUE. There was no systematic approach in terms of capacity layout of the systems or capacity building of the operators.

Meanwhile, PUE has become more important for the Government of Senegal and for EnDev (donors). The approach is addressing several opportunities for increasing PUE: (1) increasing PUE within the existing ERIL systems, (2) piloting new ERIL systems with higher capacities to accommodate PUE systematically, (3) promoting PUE standalone systems. The activities for the implementation of (1) and (2) are complementary to component I. The key idea is that ERIL operators already have a close relationship to their clients and their village. Depending on the capacity situation of the respective mini-grid, they can become advocator and demand aggregator for PUE devices or even a sales agent of suppliers. ASER also developed a concept of a revolving fund (including awareness interventions) for the promotion of PUE in the ERIL that will be supported. EnDev assessed the PUE market opportunities during field visits including interviews with local businesses at village level.

PUE should not only be driven by technology considerations. Plan International is coming from the business development side and approached EnDev for collaboration. In this case, Plan is starting with the community and the business ideas in a few EnDev villages. EnDev is supporting them on the energy side with the opportunity to learn about the Plan concept for potential future application.

The experiences with the promotion of PUE technologies in ERIL will be documented and shared with partners through the knowledge platform of ASER as well as through meetings with other stakeholders of the sector.

The situation in the submarket of standalone PUE applications is very different. They represent already today a significant share of the standalone systems sold by the PayGo sector (particularly solar water pumping). Therefore, the approach described under “component II : Foster market-based access for standalone solar solutions through PayGo companies” directly supports the promotion of the market for standalone PUE devices and will not be repeated in this section.

In the implementation of activities in this component it is important to steer the processes towards targeting at least 40% women headed companies or those that mainly employ women.

### **Activities**

#### **Key intervention 1: Training, business development, hardware**

- Facilitate business collaboration between suppliers of PUE devices and operators of mini-grids as a distribution system for PUE equipment. Based on an assessment of business potentials of PUE in Mini-grids, EnDev will sensitise operators of mini-grids on PUE technologies available in Senegal for their ERIL structures and the business cases

related to these technologies. In case of interest, they will be trained on becoming demand aggregator for these technologies and linked suppliers of these systems.

- Piloting a new mini-grid concept that is able to meet current and future community energy needs with special focus on PUE development. This will only be applied yet in 1 out of 7 pilot villages originally planned (due to budget constraints).

### **Key intervention 2: Awareness raising and marketing**

- Supporting ASER in creating awareness on PUE technology opportunities in EnDev ERIL.

### **Key intervention 3: Access to finance**

- Supporting ASER in the implementation of a PUE technology promotion intervention. EnDev will provide ASER with “in-kind” contribution of systems of different PUE technologies to kick-start the revolving fund. ASER will be advised on the design of the revolving fund and its implementation. ASER shall ensure that at least 40% of the selected small enterprises benefitting from the fund are female headed or employing mainly female workers.

### **Key intervention 5: Evidence, learning transfer and innovation**

- Documenting lessons learnt from new technical mini-grid concepts and new operation models (including digitalization) as well as PUE interventions;
- Supporting ASER in the creation of an advisory platform for mini-grids for sharing lessons learnt with interested partners in the sector including PUE learnings;
- Reaching out to other stakeholders in the PayGo subsector for better knowledge of their lessons learnt including PUE.

### **Key intervention 6: Partnerships and alliances**

- Collaboration with Plan International in the promotion of PUE in villages electrified with the support of EnDev.

### **Reason for Approach**

The approach for developing the markets for PUE devices both for mini-grids as well as for standalone technologies is based on opportunities for collaboration:

- Plan International received a funding for developing PUE in Senegal. They are specialised on facilitating productive activities, but they do not have much experience in energy. Together, the two projects will promote PUE solutions in mini-grid and SHS villages in about 8 selected EnDev villages.
- ASER is the owner of the ERIL and is planning to increase PUE use. EnDev will test their ability to stimulate the PUE markets with a rather small in-kind contribution.
- In parallel, EnDev is facilitating the direct link between suppliers of PUE devices and the operating companies. However, it should be noticed that this intervention can only start where the resilience of the grid power supply has been increased as businesses cannot afford to invest in PUE technologies in an unreliable power supply environment.

In the submarket of standalone PUE technologies, all justifications for the approach of the PayGo sector apply here as well.

## **Effectiveness and Cost-Efficiency**

Based on the track record of promotion of productive uses, the collaboration with Plan International is promising to be effective and cost-efficient (as Plan is using their own funding).

The collaboration with ASER on PUE promotion is a bit of a pilot for “testing the waters” on a small financial risk. If found to be effective and cost-efficient, a scaling up can be discussed for future funding.

The facilitation between private sector actors (suppliers of PUE technologies and operators of ERIL) does not require a lot of funds. However, effectiveness depends significantly on the development of the overall economic development in Senegal and the success of re-establishing reliable power supply with sufficient capacity in the mini-grids.

In the submarket of standalone PUE technologies, all considerations on effectiveness and cost-efficiency of the PayGo sector apply here as well.

## **Component IV: Increase transfer of learnings in the sector both institutionally (ASER) and bilaterally**

### **Approach**

ASER and EnDev have influenced a lot of donors to buy into the ERIL concept and to invest into the installation of similar systems. This was a great success at the time. The problem is that this is still prevailing, while we do know better today than 15 years ago. It is time that ASER and EnDev systematically provide the learning from the last 5 years of consolidation and research on new solutions with the rest of the sector.

A two-fold approach is envisaged. As an entry-format, a digital mini-grid advisory platform will be developed under the auspices of ASER. Being an online tool, it will be available for all interested stakeholders and can be used by ASER to inform new projects about recent learnings. EnDev will document the most important learnings on the platform.

However, we know from practice that these digital formats usually are just the starting point for exchanges on more specific questions (e.g. in workshops, at round tables or bilaterally) between EnDev and other stakeholders. EnDev will provide capacities for advice and field visits as required. A prominent example is the PADERAU project, where discussions have already started and will continue in the future.

### **Activities**

#### **Key intervention 4: Evidence, learning transfer and innovation**

- Documenting lessons learnt from new technical mini-grid concepts and new operation model (including digitalization).
- Advising the new EU PADERAU Program on EnDev lessons learnt during concept development (and potentially implementation): RBF approaches, innovations for mini-grids.
- Supporting ASER in the creation of an advisory platform for mini-grids for sharing lessons learnt with interested partners in the sector.

## **Reason for Approach**

The creation of a digital learning format has several reasons:

- It can be maintained up to date without printing costs;
- It is accessible without in-person meetings or the need for appointments;
- It can easily be used by the clients.

Choosing ASER as the host for this platform is on one side respecting the role of ASER as a key actor for rural electrification in Senegal and as the direct counterpart of the project in rural electrification. Secondly, it is reducing the risk that the website hosting the tool will be terminated at the end of the financing program. ASER expressed its support for hosting this platform.

Based on the 2019 funding, EnDev Senegal has recruited more national staff to implement the higher funded project interventions. With the reduction of the funding for own implementation, this staff will now also be available for advising stakeholders in Senegal. So far this is done opportunity driven. However, EnDev will also address other stakeholders more systematically for knowledge sharing.

## **Effectiveness and Cost-Efficiency**

As investment costs are low, cost-efficiency is not really an important factor. As for the effectiveness, the combination of an online platform with individual advice is deemed to be quite effective for the provision of information. However, it is up to the stakeholders if the provision of information will have an influence on their decisions as those are not always just based on technical information.

## **Component V: Support coordination and collaboration in the sector of rural electrification**

### **Approach**

The Ministry of Petroleum and Energy has requested EnDev to support the development and implementation of a geospatial planning tool to be used by all stakeholders in the sector in the preparation of the 2019 programming. This component responds to this request, which also addresses a fundamental source of insecurity for all investments in the sector.

The project will recruit a service provider who will consult with the relevant stakeholders and develop a planning tool that permits the transfer of information of the different existing tools (as much as possible). It will require complementary lobby work to ensure that many stakeholders make use of the tool.

### **Activities**

#### **Key intervention 5: Policy advice and capacity development**

- Development and introduction of a geospatial tool for national electrification planning.

### **Reason for Approach**

It is a direct response to the request of the Director of Electrification in the MPE. In a “Note de Service”, the Minister of Petroleum and Energy declared the creation of a committee to support the GIS-Energy planning tool that shall be oriented on the strategy as defined in the “Lettre de Politique” for the development of the Energy sector.

## Effectiveness and Cost-Efficiency

The effectiveness of the tool will be dependent on the convenience of use and applicability, the accessibility for all relevant stakeholders and the motivation of all to supply good information and to keep it up to date. While this problem can be addressed partially in the process of designing the tool (stakeholder process), it will be the role of MPE afterwards to motivate all relevant stakeholders to apply the new system.

## Cooking Energy

### PUE technologies (fish processing)

#### Introduction: A generic approach for PUE in the cooking energy sector

Before 2019, EnDev Senegal had not yet worked in the field of efficient technologies for productive uses of cooking energy. Criteria for the selection of suitable business subsectors were developed: high consumption of biomass fuel (mainly firewood), very wasteful baseline technologies and techniques, enough income to finance investments, more efficient solutions at least internationally available (still to be locally adapted), high relevance because of scale (number of entrepreneurs), large share of female workers and female-headed businesses, etc.

EnDev Senegal is applying the following generic approach for the promotion of PUE in the cooking energy sector (to be adjusted to the case)

<b>Scouting phase</b>
Baseline study
<b>Piloting phase</b>
If the baseline study is confirming the technical and economic potential as well as the relevance of an intervention, a first phase of piloting will be initiated
<ul style="list-style-type: none"><li>• Product development: support to introduction, adaptation and/or development of “modern” devices and services including lab and field testing, participatory processing on existing knowledge, perceived needs, expressed expectations and priorities for solutions;</li><li>• Supply side development: enhancing private sector supply capacities in a selected pilot submarket;</li><li>• Demand side development: sensitisation, demonstrations, mobilisation in targeted submarket;</li><li>• Market development: facilitating links between demand aggregators (e.g. business associations) and suppliers, quality control and labelling of products, monitoring of sales etc;</li><li>• Documentation of lessons learnt</li></ul>



### Market development phase

Once the market development in the piloted submarket confirms the suitability of the business case, a second phase for the national scaling-up will be initiated

- Professionalisation and expansion of the supply chain (including BDS);
- Expansion of awareness raising and marketing interventions into other sub-markets;
- Fostering enabling environment through engagement of government, NGO and private sector partners;
- Facilitating growth through private sector investments, access to finance etc.

Based on these general considerations, the artisanal fish-processing and the artisanal bakeries have been selected as first and second pick for the present project phase. In the description below, reference is only made to the case of fish-processing, as the baseline study for the bakery sector still has to be implemented.

### Approach (fish processing)

Following the generic approach, the following activities to support the developing a market for the access to modern fish processing technologies will be implemented (structured by the key interventions of the ToC).

### Activities

#### Key intervention 1: Training, business development, hardware

- Introduction and adaptation of efficient fish-processing technology developed by EnDev in Malawi including participatory processes for baseline assessments and innovation validation processes. In collaboration with local (mainly female) fish processors (associations) in selected pilot markets, university research centres and selected (private sector) producers, the technology from EnDev Malawi will be tested and adjusted to the situation in Senegal in terms of convenience of use, fuel efficiency as well as economic viability.

		
<p><u>Senegal: “Improved” parpaing fish-smoking device</u></p>	<p><u>Senegal: fish processed on the sand of the beach</u></p>	<p><u>Chitofu 3-in-1 with smoking cabinet (as developed by EnDev Malawi)</u></p>

- Development of technical specifications and guidelines for the efficient fish-processing technology.



- Identification of producers for efficient fish-processing technology. Selection criteria for interested enterprises that want to invest into building up the supply chain will be developed.
- Support for identified producers: training (production, marketing, distribution, business skills, finance sector...), investment support, quality control, monitoring of supply chain. Enterprises will receive similar support as in the ICS industry (training on technology and business, quality control, investment support, first orders for demo-units, advise on marketing and supply chains).

### **Key intervention 2: Awareness raising and marketing**

- working with a government partner, like the Regional Fishery inspectorate affiliated with the MFME, national associations, local associations and groups to create awareness on efficient fish-processing technologies. The groups (GIEs), local associations and national associations play a central role in assessing the quality of the technology and subsequently supporting the development of the demand for the technology amongst their members in the selected submarket.

EnDev will support market development through monitoring and quality control. This could be either directly or through a local NGO or government partner (e.g. the Regional fishery inspectorate affiliated with the MFME, and the department of Water and Forest affiliated with the Ministry of Environment and Sustainable Development MEDD).

- use of local media (e.g. local radio) to promote higher quality of processed fish as a benefit and selling point for users of efficient fish-processing technologies.

### **Key intervention 3: Access to finance**

- mainstreaming of efficient fish-processing technologies into traditional "tontine" saving group approaches of GIEs or local associations. Like in the ICS producer association, a savings-group system (traditionally called "tontine") will be instrumental for reducing the investment barrier. If that is found insufficient, the project can complementary initiate a revolving fund approach.
- Sensitising the financial sector about financing opportunities (e.g. with business plans, financial models, IRR calculations, etc.) in the fish processing sector.

### **Key intervention 4: Evidence, learning transfer and innovation**

- Piloting, data collection and analysis.
- Documentation of lessons learnt.
- Data sharing with universities, ministries, interested projects and NGOs.

### **Key intervention 5: Policy advice and capacity development**

- Supporting NDA to assess relevance of this subsector for the national emission targets and policies.
- Training 3 national associations on efficient fish-processing technologies.
- Developing technical guidelines for fish-processing devices that could eventually become a standard.

### **Key intervention 6: Partnerships and alliances**

- Working with the direct target groups (artisanal fish-processors), their groups (GIE), their local (= transformation sites) associations and their 3 national associations.
- Developing an "exchange format" with NGOs, projects and government partners (Regional fishery inspectorate affiliated with the MFME, and the department of Water and Forest affiliated with to the Ministry of Environment and Sustainable Development MEDD) active in the field of artisanal fishing or fish processing or mangrove forest conservation.
- Supporting local associations of fish processors in improving the infrastructure of the fish-processing sites.

### Reason for Approach

- Proven concept: The suggested approach is following the positive experiences of EnDev Senegal in the ICS sector. In 2006, EnDev started to support the ICS market in Senegal when the technology was already introduced, but the market was not functional. We applied a professionalisation approach as described in the generic description (see table above) with interventions on the supply side, demand side and sector development and managed to grow the market until to date more than tenfold.
- Proven partners: For certain aspects, partners from the successful ICS work can partially be used in the implementation (e.g. chamber of crafts, universities).
- Proven innovation: There is a graveyard of failed fish-processing innovations in Senegal and other countries (e.g. FAO: FTT model). Some of them never worked well technically, others were inconvenient, and again others were too expensive to become a commercially viable solution. By 'importing and adapting' the recent experiences from EnDev Malawi, the concept is based on an already technically proven innovation: the base is a fire-chamber of the Mayankho institutional cookstove, replicated over 5,000 times in the last 10 years with no major failures. The smoking cabinet is based on the Altona concept but adapted to an African context in terms of materials and structure. Lab test on the processed fish product in Malawi revealed 4-times longer shelf-life and no traces of PAH. Consumer tasting events resulted in high preferences for the fish processed using the new technology.
- Proven instruments of development cooperation: the approach does not require any complex, innovative administrative processes, that could delay implementation.

Entering a market with a new product is always associated with risks. However, the selected approach is based on solid experience and proven processes. The main challenge will be the poor economic environment due to the COVID-19 crisis that will undermine the ability of clients to invest into the new technology. However, there is hope that until the start of the market-based growth of the subsector in 2022, the conditions for investments will be better.

### Effectiveness and Cost-Efficiency

The reasons for the selection of the approach in the section above is the likeliness of its effectiveness.

However, there are other approaches that could be employed. Some examples are:

- Innovation Fund: A national call for innovators (enterprises, universities, incubators) to present prototypes and concepts for fish-processing technologies:

An innovation fund can be either a competition (the winner gets the prize) or a selection of a defined number of fundable proposals. The advantage is that the process can reveal solutions off the well-known tracks. However, innovating fish-processing requires understanding its principles. In Senegal, very little capacity and expertise on this topic is available; hence, the chance for workable solutions will be small. Furthermore, this approach only delivers (yet another) unproven innovation with a lot of time already invested, yet the market for it still would need to be developed. Hence, it has low chances for effectiveness and a medium cost-efficiency.

- RBF: A call for companies to import and/or produce locally and distribute improved fish processing devices that adhere to certain quality standards;

An RBF is a good instrument if you have a proven product in market A and you want to motivate the companies investing to extend their distribution chain towards market B. This is not the case for fish-processing in Senegal. There are no suppliers of a proven improved technology available in Senegal or beyond (at least if we limit us to affordable solutions). It could be a cost-efficient solution though when it comes to the scaling of the market in the next project phase. However, one limitation is that the technology will probably consist to a larger part of construction work, which has limited potential for RBF compared to over-the-counter products. Hence, the applicability limits the effectiveness of the approach, whereas the cost-efficiency could be high.

- (Inter-)National tender: outsourcing the component: the whole topic will be outsourced to a third party with experience in the sector:

In Senegal, there is very limited expertise available on this matter (see innovation fund). Outsourcing to a national partner would only make sense if there is already a champion of the topic active in the field, as using him would allow EnDev to save time and efforts of building up an own team and competences. However, this partner is not available. For an international tender, the time and the budget available is not attractive enough. Additionally, EnDev is already developing its own competence in Malawi and it is therefore more cost-efficient using the same service provider in Senegal. The two country teams will benefit from exchanging on learnings from their specific approaches and technological modifications. It also should be considered that the preparation, tendering, selection and contracting of a partner for outsourcing a component is a time-consuming process which would cause the start of the implementation to be delayed until 2022.

## 1.16.6 Results

The program aims at achieving the following direct impacts:

- In Rural Electrification, the project will achieve an “accelerated growth of access to modern energy services and products for households, small enterprises and social institutions in remote rural areas in Senegal (both in ERIL as well as in the free market).” The number of people with access to electricity will rise from nearly 50,000 in 2020 to 70,000 at the end of 2023.
- In Cooking Energy, the project aims at achieving an “enhanced adoption rate of efficient fish processing technologies amongst artisanal fish processors in selected (vision: all) fish processing beaches of Senegal.” As this technology still has to be

introduced to the market, the baseline is zero. The aim is to have 675 small businesses to invest into the new technology until the end of 2023.

<b>Project results</b>	<b>OCS 2020 (baseline)</b>	<b>Absolute Targets (2010-2023)</b>	<b>Additional Targets</b>
People: Access to Electricity	49,819	70,000	20,181
People: Access to Cooking	1,296,549	1,333,993	37,443
SI: Access to Electricity	988	1,188	200
SI: Access to Cooking	0	0	0
PU: Access to Electricity	649	899	250
PU: Access to Cooking	0	675	675

The access to cooking energy for people in the OCS of 2020 is now taken as the baseline for the EnDev/GCF project. An annual growth of 2.5% is attributed to EnDev (creating the additional target of 37,443).

The additional targets for social institutions and small enterprises to be reached by electricity are in the range of the AP 2019 and just added on the new baseline of the OCS 2020.

There are two gender specific indicators:

- (1) At least 50 women groups will become retailers of PV systems in collaboration with PayGo companies;
- (2) At least 40% of the electrified SMEs shall be run by women or employ mostly women.

The direct impacts will contribute to changes at the level of indirect benefits as outlined in the ToC for rural electrification and cooking energy.

### **Energising Lives – social development**

Many indirect impacts of rural electrification and cooking energy are rather generic. However, there are some special highlights to be pointed out below:

- In rural electrification, EnDev is working with women groups for the marketing of PV equipment and setting an indicator for ASER to select at least 40% women headed enterprises (or predominantly employing female staff) companies. Hence income for women will improve.
- Women will be able to invest into buying their personal PV system.
- The income through rural small businesses will increase. Women Economic Empowerment will be particularly strengthened in the field of modern fish-processing due to the large share of women operating in this sector.
- Working conditions in the fish-processing companies will improve, as less smoke is emitted. This benefits particularly the many female workers.
- The improved availability and accessibility of highly nutritious fish products for the population of Senegal. The new fish-processing technology is improving the quality of the processed fish and is increasing the shelf-life significantly. As the products are

an important part of the traditional Senegalese cooking culture, these improvements of quality and quantity will directly have an impact on the nutrition of the customers.

### **Energising Opportunities – economic development**

In the sector of rural electrification, the number, intensity and diversity of productive uses in project villages will increase. Entrepreneurs will invest more into their business and create more employment. The introduction of the new fish-processing technology is reducing the cost of production (less fuel), reducing the loss of fish during the processing and distribution, increasing the quality of the processed fish which potentially can also increase the unit selling price and reduce the work-load and processing time of (mainly female) workers, allowing for a higher turn-over.

### **Energising Climate – Combatting climate change**

The indirect impacts on climate change is particularly visible in the component of cooking energy. In this pilot phase, the quantity of emission reduction will be small as the market. However, general the technology will reduce the emission for heat production and for smoke production, reduce the overall emissions per kg of processed fish and reduce the impact on deforestation.

## **1.16.7 Sustainability**

### **Rural Electrification**

The sustainability will be discussed separately for the subsector of the ERIL and the market-based standalone systems (“PayGo market”).

#### **Financial sustainability**

ERIL sector: The “build back better” approach helps to increase financial returns through the introduction of digital payment. More professional management, better quality and reliability of service provision and security of investments through higher institutional sustainability (see below) forms the base for improved financial sustainability for the operators.

“PayGo market”: Better access to finance will allow PayGo companies to scale their business, thus reducing the overhead costs per unit sold. The introduction of a Customer Reference Systems will reduce the delays of payments and the number of dropouts of clients, which will positively impact the overall financial sustainability.

However, both sectors highly depend on the overall economic development in Senegal in the light of the current COVID-19 pandemic.

#### **Institutional sustainability**

ERIL sector: The introduction of a geospatial planning tool will provide the base for better coordination between different governmental actors and donor-financed projects. Once the harmonization of the tariffs is completed, the government can sign the contracts for the operators, giving them the required security for investments.

“PayGo market”: In the interviews, the PayGo companies did not mention any challenges on the institutional sustainability of their businesses or their markets.

#### **Ecological sustainability**

Both subsectors: EnDev and PED have jointly commissioned a study on appropriate solar waste management in Senegal and will support the implementation of the recommended approach. In parallel, the use Li-batteries will be tested as an alternative for the future.

### **Technological sustainability**

ERIL sector: The “build back better” approach focuses on the introduction of components and operations systems that enhance the technical sustainability of the systems. Based on nationally sourced components, a more professional management system improves the quality of maintenance and the quality and speed of repairs.

“PayGo market”: The densification of sales and the collaboration with women groups will allow to improve after sales services.

### **Social sustainability**

ERIL sector: The social sustainability has a twofold challenge now. In the current system of monthly flat rates at different service levels based on a power limiter, the lower access levels are paying more (per kWh) than the larger consumers. However, this is not the reason for the increasing tensions between clients and operators. During the consultation processes for the harmonization of electricity tariffs between on-grid and off-grid electricity, the rural population has been promised that their electricity tariffs will be lowered. This has created huge expectations amongst the rural poor. However, the implementation of the reform has not yet reached the ERIL level, causing mistrust and frustration amongst clients in an increasing number of villages to the extent that some villages have forced the operator to dismantle the mini-grid as they rather not have electricity than pay higher tariffs. The implementation of the tariff harmonisation in ERIL is therefore essential for the social sustainability. While technologically the project is preparing all the necessary conditions, it is a political and financial decision as the government needs to provide the funds for the subsidy paid to the operators compensating the losses incurred due to the lower tariffs.

“PayGo market”: No threats to social sustainability known and foreseen.

## **Cooking Energy**

### **PUE technologies (fish processing)**

At present, the market for fish-processing technologies provides basic “improved” traditional technologies which shelter the fire and lift the fish off the sand. “Modern” technologies have been tested or provided by projects, but never resulted in the development of sustainable supply-demand systems.

Hence, EnDev will build up a new market for modern fish-processing devices. It is likely that a higher level of sustainability in the market will only be reached at the end of the phase that is following this funding (e.g. 2024-2027). However, the base for the sustainability of this new market must already be prepared now at the onset of the intervention (see sections below).

### **Financial sustainability**

Based on the results of the baseline study, the annual net profit of fish-processing on a traditional device is roughly 14,500 EUR. This annual net profit may increase to 46,000 EUR, if the “improved parpaing” device (see photo in the approach section) is used. These figures are only based on interviews and not on observations and should therefore only be used indicatively. It still demonstrates that (a) there is money for investments in the business, and

(b) that even small innovations already show a significant economic benefit. In the process of technology development, the measured efficiency gains and their financial implications have to be balanced against the investment costs and the life-span of the technology to offer a short payback period and an attractive return on investments.

### **Institutional sustainability**

The mainly female artisanal fish processing entrepreneurs are well organised in groups (GIE), local associations (per fish landing site) and in 3 national associations at aggregate level. While EnDev has no experiences so far in working with them, this is much more institutional backbone than in many other sectors. Hence, the demand side organisation is likely to be independent of project support within a short period of time.

On the supply side, it is not yet clear which type of producers will engage in this business. It is likely that it will follow similar evolutionary processes of artisanal beginnings leading to more professional and business-oriented endings, which would also permit better institutionalisation of the service providers. It is essential to task the producers right from the beginning with the responsibility of distribution and marketing. This will result in the development of solid partnerships with the demand aggregators until the end of the project.

The natural partner on the government side for this component is the Ministry of Fisheries and Maritime Economy, who will be implicated from the beginning of the implementation. As EnDev works closely with the NDA and the Ministry of Environment and Sustainable Development on the EnDev/GCF project, there is a good chance that the NDA will take this sub-sector into consideration once results are clear and the magnitude of the effect on GHG emissions can be quantified.

### **Ecological sustainability**

The materials used in the technology are likely (based on the Malawi model) bricks and cement for the fire chamber and metal sheets and wood for the smoke cabinet. There are no significant environmental challenges regarding these materials. It is unlikely that the processing technology will have significant (positive or negative) impacts on over-fishing, the fishing habits etc. given the fact that the larger share of fishing is done for the industrial fish processing sector. In terms of fuel use, the experiences from Malawi suggest that the specific fuel use of fish-smoking compared to the improved traditional technology can be 60% or better. However, it has to be noted that fish processors currently also use straw and other biomass beside of wood (particularly for creating the smoke).

### **Technological sustainability**

The technology will be based on local production for local clients. As 'fish-processing' is only done at dedicated landing zones at the coast, the suppliers can afford to maintain close links with their clients who are concentrated in a few places. The strong organisation of the users (local associations) will also permit to establish maintenance services in case the suppliers may not be strong enough to do so.

### **Social sustainability**

The modern fish processing technology shall be affordable for all GIEs that are currently working with traditional technologies. This will ensure both a widespread application as well as the inclusion of most of the fish-processors in the long term. This inclusion can be fostered if associations use their tontine system or a revolving fund to help their members with



the initial investments (if required at all). If the new technology is increasing the viability of the business as hoped, there needs to be attention paid to the gender aspect. In the baseline study, about 73% of the fish processors at the sites visited by the researchers were female (4,772 of 6,500). An increase of profits may attract more men to engage in the business. In that case it would be important to ensure that women will not be muscled out of their business. However, considering the high level of organisation in the associations of female fish processors, this is an unlikely development.

### **1.16.8 Gender Strategy and Safeguards**

EnDev SN benefits from a favourable policy and legal environment (macro level) in terms of gender equality but is faced with limited knowledge and experience in implementation of gender aspects coupled with rigid cultural norms, inter alia a strong patriarchal societal structure, conflicting with an active gender equality promotion. EnDev SN's gender approach will follow a bridging strategy to address gender gaps in the sector from a top-down as well as from a bottom-up perspective.

The Ministry of Petroleum and Energy (MPE) has recently established a gender unit. As part of a top-down perspective on gender, EnDev will support and collaborate with that unit in terms of capacity building (focal point) and integration of the gender dimension by drafting strategic political documents. Additionally, EnDev will offer assistance in the implementation of ASER's gender commitment with regard to the missions and activities of electrification concessionaires and ERIL operators. This could be i.e. by offering technical support and/or establishing an incentive framework for the adoption of gender-sensitive approaches. Furthermore, EnDev is aiming to enter into a new collaboration with the Ministry of Fisheries and Maritime Economy (MFME). As MFME's Gender Diagnostic is still not published, the need and potential for EnDev's support to this new partner in respect to gender remains to be defined.

The off-grid rural electrification (both ERIL and stand-alone systems) in Senegal is a sector which is still dominated by men. Women rarely play a role as an actor in the supply chain or in the sector environment. EnDev will facilitate a dialogue between women engaged in different positions of the sub-sector for establishing an assessment of the current situation and ideas how to improve women (economic) empowerment both on the service provision of rural electrification as well as the productive use of these services. The results will be used for improving EndeDev's project planning, but also for stimulating discussions in the partner structures (in partnership with the gender unit of MPE) and the larger stakeholder community.

At the level of project activities, EnDev selected "fish processing" as a sector because of its high relevance for women (app. 75% of the actors). These female entrepreneurs and their associations will be implicated in all steps of the process chain as outlined in the approach. Their specific socio-economic situation will be the base for the business case calculations, as they as the key actors will later decide about the success of the intervention. This includes the facilitation of a potential use of the traditional women group financing scheme (tontine).


By integrating a gender-sensitive approach into EnDev's monitoring and evaluation system, the project will collect more in-depth quantitative and qualitative social data in the intervention zones, among others to identify early unwanted adverse impacts caused by women's empowerment. This shall further inform stakeholders and drive the development of relevant policies and programs. Furthermore, EnDev will share gender-sensitive materials based on lessons learned to interested stakeholders (universities, ministries, interested projects and NGOs).

EnDev further sets gender-specific targets for rural electrification, notably with regard to PUE: (1) At least 50 women groups will become retailers of PV systems in collaboration with PayGo companies; (2) At least 40% of the electrified SMEs shall be run by women or employ mostly women.

EnDev Senegal is now part of a sub-cluster "Access to energy", together with the GBE project and the EnDev/GCF project. All three sub-teams will participate in trainings on gender and social and environmental safeguards organised in the context of the EnDev/GCF project.

# 1.17 Tanzania

## 1.17.1 Summary and key data

Promoted technologies	 Please insert respective boxes here		
	<p>EnDev in Tanzania’s approach is market development – expanding the pioneering market in cook stoves to greater access, deeper penetration, and broader service provision. Building on the current SNV’s cook stove programming (2013-20), we will:</p> <p>Establish our proven cook stove technical and business development approach to cultivate new producers in four new regions and bring 11 emerging markets to pioneering phases.</p> <p>Entrench market penetration of quality improved cook stoves in three markets from pioneering to expansion phases by refining innovative demand-side behaviour change communication (BCC) strategies paired with performance-based financing around successful cook stove champions.</p> <p>Evolve market development towards mature phases in our two most developed regional markets by introducing higher tier cook stove options (including e-cooking). The programme will further stimulate sector evolution by voicing the experience of enterprises for their greater representation in national cooking energy frameworks alongside the Tanzania Renewable Energy Association (TAREA). The programme will continue to support TAREA’s advocacy role to localise cooking energy agendas with the new cooking lead ministry of the Vice President’s Office of Environment (VPO).</p>		
Summary of proposed interventions(s)			
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	-	People	NA
Cooking / thermal energy for households	670,438	People	Outcome 1. Increased access to ICS through developing skilled ICS producers in 21 regions Outcome 2. Increased productivity of ICS producers Outcome 3. Increased adoption of “Smart” cooking products and practices promoted by Behaviour Change Communication (BCC) Outcome 4. Increased sales of higher tier cook stoves and e-cooking technologies
Electricity and/or cooking / thermal energy for social infrastructure	-	SI	NA
Energy for productive use / income generation	-	MSMEs	NA
Project period	01.01.2021 – 31.12.2024	Indicative Budget	EUR 3,349,202 <sup>69</sup>

<sup>69</sup> Sum of balance from 2019-2021 contract period (including additional budget for 2021 extension) at close Dec 2020 (EUR 1,324,562), plus new budget for Budget period Jan. 2022-Dec.2024 (EUR 2,024,640).

### 1.17.2 Theory of change (ToC) and state of market

Throughout Tanzania families universally rely on biomass for cooking with firewood (60.9%) alongside charcoal (28.8%) recorded in households. In rural areas, firewood (84.8%) and charcoal (11.8%) consumption are starkly contrasted to urban firewood (17.4%) and charcoal (16.5%) usage. Increased enforcement of biomass regulations is resulting in biomass fuel cost increases that have heightened improved cooking demands. The government has introduced a formal ISO compliant Improved Cook Stove (ICS) standard, signalling interest towards sector professionalisation. The promotion of modern cooking energy (higher tier cooking stoves and clean fuel options such as electricity and LPG) are also priorities of the Government of Tanzania (GoT). According to Tanzania's Energy Access Use Situation Survey II (EASUSII) of 2020, electrical connectivity in any form (grid or solar) was recorded amongst 36% households (68% urban, 19% rural). E-cooking seems particularly relevant for urban areas of Tanzania with an electrification rate of 68%.

With other actors, such as UNIDO and the European Union, taking an increased focus to Urban household cooking (access to alternative fuels and higher tier cook stoves), EnDev will continue to drive results through peri-urban and rural areas with our proven technical and business development approach for locally produced ICS. In this 2021-2024 phase we will take an approach which continuously assesses the state of each regional market to determine the tailored support provided by the programme (Establish, Entrench or Evolve)<sup>70</sup>.

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<sup>70</sup> The 2021-2024 phase EnDev Tanzania will focus efforts on the Cooking sector. In the 2019-2020 phase a Results Based Financing for Productive Use of Renewable Energy was initiated through an inception phase as a Top-up (TUP) to the Base Programme, however due to EnDev global funding constraints this component will not continue into implementation as part of the 2021-2024 programming.

## Theory of Change - EnDev Tanzania

<b>Impacts</b>	<b>Energising Lives - Social development</b> Improved quality of life for people, especially women and girls, as ICS creates cost and time savings, lowers indoor air pollution exposure, and reduces risks of SGBV experienced during wood fuel collection.	<b>Energising Opportunities - Economic development</b> Increased job opportunity in ICS production and marketing.	<b>Energising Climate - Combating climate change</b> Increased adoption of ICS reduces GHG emissions by lowering fuel consumption and deforestation caused by wood fuel harvesting.
<b>Assumptions</b>	ICS producers are using improved business practices and have enhanced product quality, creating a sustainable market for their products. Improved cooking solutions become more widely accessible, affordable, and desirable. The enabling environment in the Cooking sector is improved increasing national focus and government support to the transition to improved cooking solutions.		
<b>Outcome</b>	<b>Outcome 1:</b> increased access to ICS through developing skilled ICS producers in four new regions <b>Outcome 2:</b> Increased productivity by existing ICS producers <b>Outcome 3:</b> Increased demand for ICS through adoption of improved cooking practices promoted by Behaviour Change Communication (BCC) approaches <b>Outcome 4:</b> Increased sales of higher tier cook stoves and e-cooking technologies		
<b>Assumptions</b>	Introduction of higher tier/e-cooking products in the most developed markets paired with clear value proposition messaging will motivate households to buy higher tier options		
<b>Outputs and results</b>	Emergence of class of bankable ICS producers, operating at scale Appropriate ICS available in wider regional and rural district extents of the country (four new regions) Three additional wards develop community-led Smart Cooking culture through a BCC approach Clearly defined sector/policy structure for standards dissemination, testing and labelling Clearly defined institutional 'home' for cooking sector		
<b>Key interventions</b>	<b>Business development:</b> * Extend a proven technical and business development approach to cultivate new producers in four new regions and bring 11 emerging markets to the pioneering market level * Introduce higher tier cook stove options (including e-Cooking) in the two most developed regional markets <b>Access to finance:</b> * Extend higher value results based incentives in three new wards to shift from pioneering to expansions market levels <b>Behaviour change:</b> * Implement Behaviour Change Communication (BCC) programmes in three new wards <b>Policy capacity development and advocacy:</b> * Build on an existing partnership with TAREA to further improve cooking sector coordination and regulatory frameworks		
<b>Barriers</b>	<b>Supply side barriers</b> ICS producers/clay artisans lack product design specifications and training needed to craft improved cooking solutions oriented to rural consumer markets ICS producers lack business capacity and access to capital to support scaling Supply chain for e-Cookers to peri-urban and rural areas is not well-established	<b>Demand side barriers</b> Consumers do not see need for improved cooking practices and technologies because there is low awareness on how poor cooking practices lead to unfavourable socio-economic impacts (especially for women and girls) e-Cooking (e.g. electric pressure cookers) value proposition is not widely understood	<b>Enabling environment barriers</b> Biomass cooking standards have been announced, however no clear path has been formulated for quality assurance, testing and standards labelling.  VPO has agreed to take on the role of lead Ministry for biomass cooking, but the structures have yet to be solidified.
<b>Assumptions</b>	Transition to liquid biomass fuels (e.g. ethanol) and/or solid biomass briquettes as main cooking fuel source will require comprehensive government programming support. EU Integrated Solutions for Clean Cooking (ISCC) programme will focus more on urban markets and these alternative fuels among others. e-Cooking programmes implemented through Modern Energy Cooking Solutions (MECS) programme in partnership with local actors focus on two regions providing product testing, retailer training and product servicing training. According to Tanzania's Energy Access Use Situation Survey II (EASUSII) of 2020, electrical connectivity in any form (grid or solar) was recorded amongst 36% households (68% urban, 19% rural). E-cooking seems particularly relevant for urban areas of Tanzania with an electrification rate of 68%. The cooking sector needs to be embedded within the government ministerial structure for effective sector coordination to take place.		
<b>Root cause</b>	Growth of locally produced ICS sector is slow and producers have not reached scale to supply significant portion of rural population Supply of alternative biomass fuels (solid briquettes, liquid biofuels) is insufficient to replace traditional biomass fuels (firewood and charcoal) There is a lack of knowledge of and demand for improved cooking solutions and practices in rural markets While regional supply potential exists, adoption of higher tier cooking technologies (including e-Cooking) in rural markets is low Strong GoT support for reduced biomass dependency exists, but there is poor sector coordination and policy enforcement.		
<b>Core problem</b>	Lack of access to and adoption of improved cooking solutions is contributing significantly to deforestation, poor health, and exposure to sexual violence during firewood collection.		

### **1.17.3 Transformative character**

EnDev in Tanzania's approach is market development – expanding the pioneering market in cook stoves to greater access, deeper penetration, and broader service provision. EnDev Tanzania envisions a number of local ICS producers in the higher population density areas to grow to semi-industrial scale, achieving production volumes beyond 1,000 units per month and offering a diverse range of stoves for different income strata of the population. Modern and clean cooking solutions are expected to further their market reach from main urban centres to wider peri-urban and rural small-town markets as consumer demand for clean cooking is triggered as a personal development priority.

#### **Market Development**

EnDev will increase focus to scaling ICS product quality relative to national standards and enhance brand identity, foreseen as precursor to quantitative scaling, for semi-industrial ICS producers in post COVID-19 recovery phases. This is achieved through targeted market-level driven intervention packages which look to tailor technical and business development support based on the market transition taking place (e.g. from pioneering to expansion phases of market development).

As cooking markets develop, we will build upon a national platform with the government and TAREA which was established in the 2019-2021 phase of the programme, during which the VPO was confirmed as the “home” ministry for the biomass cooking sub-sector. This is an important development as prior to EnDev's enabling environment work the Cooking sector has had weak coordination due to several ministries having cross-cutting interest in the sector (such Ministry of Natural Resources, Ministry of Health, etc.), but no one Ministry taking the lead on policy. Now with one coordinating Ministry we expect clear policy statements and guidance for the sector in the coming phase. Goals for this phase will be further to cement this leading ministry role, articulate realistic enforcement of the newly developed national ICS standard and increase private-public engagement in the cooking sector to leverage the high potential for substantial expansion of quality eligible products available in the country.

#### **Economic Development**

The cooking programme will be expanded to stimulate an active national roster of 150 stove enterprises of which 110 are intended to reach viable local businesses (family enterprises) and medium scale formal operations (small-medium industrial company) levels. Women-led enterprises will continue to be a driving force in the programme and account for 50% of the programmes roster of ICS producers and product sales.

SNV will introduce higher tier cook stove options (e.g. e-Cooking solutions) into the two most mature markets to enhance last-mile availability of e-Cooking technologies and assess willingness to pay, adoption and usage as well as develop targeted BCC messaging to be used in demand side campaigns. This will be done by training producers in our most mature markets on e-Cooking technology, developing key demand stimulation messaging for marketing materials and providing an initial injection of product inventory as performance-based incentives based on Jiko Matawi sales. EnDev will work closely with other actors in the e-Cooking space such as Modern Energy Cooking Solutions (MECS), Access to Energy Institute (A2EI) and Tanzania Traditional Energy Development Organization (TATEDO) who have in the last

few years conducted market assessments and extensive testing on various technologies available in the Tanzania market including electric pressure cookers, rice cookers and slow cookers.

### **Social Development**

Building upon market and economic development success amongst enterprises, the programme will continue to refine and expand its whole household approaches towards shifting cultural perceptions of cooking. On the supply side, SNV's Participatory Action Learning for Sustainability (PALS) and Balancing Benefits methodologies draw female and male ICS entrepreneurs together with their spouses to progressively unlock family enterprise growth. On the demand side, we will replicate and innovate on a successful BCC approach piloted in the 2019-2020 phase with increased emphasis on using media (print/radio/television/social media) to overcome delays caused by COVID-19 and related impacts. We will build and continue to develop the Clean Cooking Advocate (CCA) model, inspired by the community health workers model, whereby women's groups are formed and trained in clean cooking practices and learn to share the value proposition for ICS and modern e-cooking options to their communities utilizing both door-to-door and community event approaches.

### **Poverty Alleviation**

Cooking solutions availed in the programme provide an affordable means for the majority of Tanzanians to acquire quality improved cook stoves for as a little as 2 EUR. This enables the programme to viably place the cost and time saving benefits of improved cooking energy access within reach of the most vulnerable of rural markets including refugee hosting communities of Kigoma region.

## **1.17.4 Collaboration**

### **Sector Alignment**

The GoT has established the transition away from traditional biomass fuels as a key national priority. While there is a desire by the state to incorporate clean fuels (LPG and electricity) and industrially manufactured cookstoves, the reality is that many rural households cannot afford the initial investment of 50-200 EUR relative to local cooking alternatives in the 2-10 EUR price range. While favourable policies to support reduced import tax on industrial cookstoves and initiatives to lessen the upfront costs of clean fuel technologies are important, there is much room for the continued scaling of locally manufactured ICS to transition families to more efficient and healthy cooking options right now.

In the 2019-2020 period, the GoT has made moves to bring articulation to the cooking sector frameworks with clear identification of a national lead ministry for cooking and adoption of quality standard provisions. Building on SNV's MoU with the PO-RALG, SNV in Tanzania will work to improve overall cooking sector coordination throughout various levels of the government and with other non-government cooking sector actors. This will be achieved by further developing, through policy statements and defined structures, on the commitment from the VPO to be the "home" ministry for the biomass cooking sub-sector.

The programme aligns with the GoT Biomass Energy Strategy in Tanzania (BEST), through supporting the efficiency with which biomass is utilised and ensuring an enabling



environment for implementation. The regulatory environment in Tanzania does not provide tax breaks for imported, industrial cookstoves, but does anticipate the reduction in consumption of biomass, so our programme ensures that there is a strong continued initiative to support the production and sales of appropriate cooking technologies.

SNV will build upon its renewed agreements with the GoT for 2019-2023 to broker tangible relations of the TAREA-led biomass cooking technical working group with relevant parties of GoT's Rural Energy Working Group within the GoT. The programme will build directly upon TAREA's programme implementation role in advocacy for enabling environment strengthening in the solar sector towards greater development of the biomass cooking sector.

Vice President's Office of Environment (VPO) – Biomass Cooking Energy Sector Lead Agency: The vision of VPO is a strong union and a safe, healthy, and sustainable environment. Their mission is to harmonise and strengthen union and non-union matters' and coordinate environmental management for the improvement of the welfare of Tanzanians. The VPO acts as an umbrella ministry for several environment issues with cross-cutting emphasis, and thus among a stakeholder group of several ministries (facilitated by EnDev and TAREA) including Health, Natural Resources, and Energy, it was decided that VPO should going forward coordinate the biomass cooking sector. EnDev in Tanzania will support VPO's initiation of cooking sectoral leadership via support of TAREA and coordination of ongoing measures alongside PO-RALG.

President's Office of Regional and Local Government (PO-RALG) – Lead Coordination Counterpart GoT: PO-RALG is responsible for co-ordinating the regional secretariats and Local Government Authorities (LGAs) and is the formal contact point between LGAs and sectoral interests as the representative of national line ministries. LGAs play an increasingly important role in local energy related policy and strategy implementation and, through this office (PO-RALG), renewed attention to improving regulatory compliance in biomass fuel production and sales (and associated revenues) have been noted in 2016. Through an MoU, EnDev coordinates on a regular quarterly basis on national level reporting, sector programme advisory platforms and local government coordination and capacity building.

Tanzania Renewable Energy Association (TAREA) – Implementing Partner: TAREA is a not-for-profit, non-government organisation registered in 2001. With more than 250 members, TAREA is composed of private sector (service providers/enterprises), professional (individuals), associate (institutions and individuals), student and international members. The objective of TAREA is to promote and advocate the increased use of renewable energy by developing an effective network of members and stakeholders who undertake best practices throughout the sector. TAREA's strategy now extending to the cooking sector highlights key issues which are pertinent to this project: capacity building, policy influence, awareness/networking, quality control and business promotion in manners conducive to government and private sector cooperation. Through its EnDev cooking energy work, TAREA is becoming a sustainable principal organisation of policy advocacy around clean cooking solutions in Tanzania, in addition to renewable electricity, but requires continued support and incubation to achieve this.

## **Implementer Base**

SNV works directly with existing local enterprises to drive sustainable development of rural accessible cook stove markets. ICS currently available on the market are almost exclusively manufactured locally by largely micro-small enterprises aggregated in (peri)-urban centres and sporadic rural localities (generally within proximity to high volume clay sites). The cooking programme will support development of a profitable business case for stove producers to reach these expanding markets throughout mainland Tanzania.

At conclusion of 2020, the active local producer base of the cooking component consists of a roster of close to 110 enterprises who have collectively realised access to improved cooking for 579,791 Tanzanians.<sup>71</sup> Women-led enterprises are a crucial driver to the programme's success and account for half of the national producer roster and results achieved to date. Amongst all producers, approximately 20 are on pace to meet and exceed "Champion" status as defined by their production of 100+ EnDev supported unit sales per month. In the 2019-2020 period, clear leaders are emerging amongst Champions with sales growing towards 500 units monthly and with whom more advanced market development supports (financial incentives, demand-side BCC campaigns and advanced BDS supports) are being availed. Gains of the programme are proving to be sustainable and scalable as benefits realised per producer are increasing and expansion led by entrepreneurs indicates continued market pull emerging from adjacent markets in the southern and interior areas of Tanzania.

In the upcoming phase, the European Union will work to roll-out the BEST-based Integrated Solutions for Clean Cooking (ISCC) programme which focuses on large urban markets. Our intervention will complement the EU programme by ensuring a continued reach of quality and modern cooking energy options in peri-urban and rural markets and through our localised planning work and national advocacy with TAREA. Our programme will also collaborate with MECS and their local partners, the A2EI and TATEDO to implement the proposed e-Cooking activities. This will ensure we build off of the work they have done such as testing different e-Cooking technologies and developing training materials for retailers and maintenance technicians.

## **Leverage**

Through supporting existing producers and suppliers to scale their businesses, the resources mobilised by the programme will increase economic activity in target markets and create jobs in these communities as enterprises go to scale. Furthermore, SNV is already engaged in planning annual budgets and activities with local governments as part of the national budget cycle with a specific focus on women and youth (under SNV's MoU with PO-RALG). However, the largely informal nature of enterprises continues to limit access to commercial finance throughout Tanzania's cooking sector. EnDev will continue close collaboration with the public, private and civil society players with strategic aims towards ensuring future financing is available and accessible to cooking enterprises in the programme.

## **Nexuses**

The programme will continue to support market development in the least developed and most vulnerable regions of Tanzania. Since 2018, EnDev has worked hand in hand with

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<sup>71</sup> Adjusted results from EnDev OCS tool to close 2020.

SNV's RESPOND project in Kigoma (in partnership with GIZ and funded by BMZ) supporting clean energy options in host and refugee communities of Kigoma region. With the ending of the RESPOND Project in December 2020, 16 Kigoma stove producers (6 Women-led) will receive continued support under the umbrella of EnDev programming.

### 1.17.5 Modalities

Although ICS interventions have been carried out by various local and international development actors in Tanzania for more than a generation, there is urgent need and considerable opportunity for increasing ICS access. Sustainable approaches that avail quality options for consumer cooking energy needs in energy-poor regions of Tanzania can build greater commercial viability of the sector in the medium to longer term at all MSME levels. However, for greater acceleration to take place, support for capital investment and technical assistance, such as we are proposing under this programme, will be needed in order to cultivate successful ICS producers enabling them to reach semi-industrial levels. Simultaneously, our BCC interventions will help intensify demand generation for improved and modern cooking amongst consumers to meet ICS producer's increased production of marketable modern cooking options. The overarching approach of EnDev in Tanzania is market development – accelerating tailored, regional cook stove market development through successive stages of the EnDev Energy Access Market Development (EAMD) framework, from pioneering through expansion stages, throughout wider extents of Tanzania and broadening greater penetration and access to quality cooking ensuring we leave no one behind.

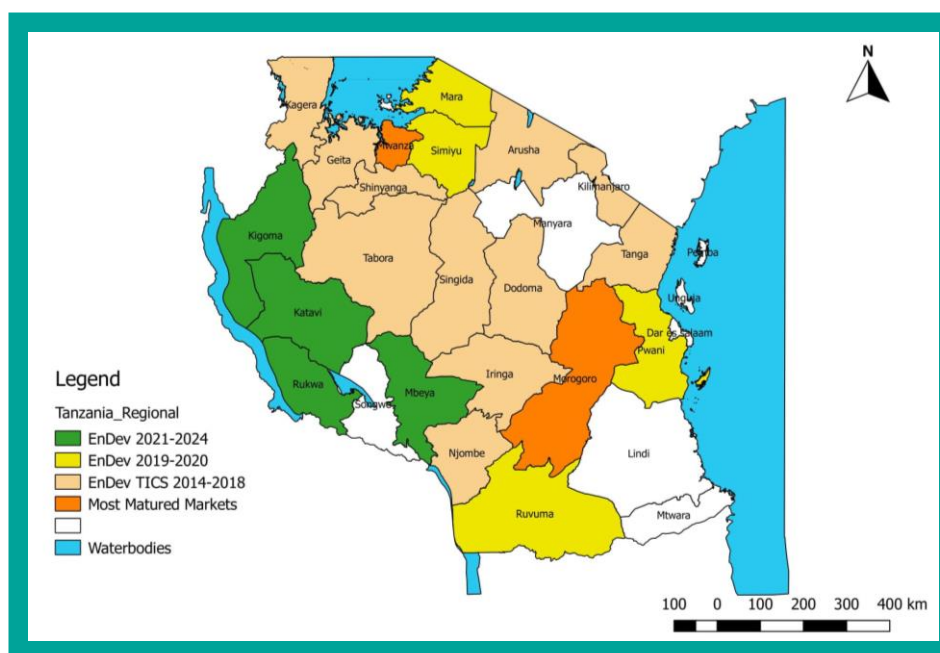


Image: Regional map of Tanzania displaying EnDev expanded coverage areas by programme phase

As a whole, SNV will expand their roster of quality ICS producers with up to 40 new local producer intakes for a national roster of 150 enterprises operating throughout mainland

Tanzania who will collectively disseminate upwards of 100,000 cookstoves annually by the close of 2024. Towards these ambitions, beginning in 2021 SNV will hone its market development goals throughout 21 regions of mainland Tanzania with three distinct approaches relative to states of regional energy access market development (Establish, Entrench and Evolve).

1. Establish our proven cook stove technical and business development approach to cultivate new producers in 4 new regions and bring 11 emerging markets to pioneering phases. The programme works to develop markets from their earliest inception with a focus towards the development of pre-commercial cook stove producers who are supported to accelerate their transition of high performers to pioneering commercial enterprises.

Planned Activities: In the 2013-18 period the cooking component worked with local enterprises to develop the ‘Jiko Matawi’ – a multi-purpose improved cookstove capable of using both firewood and charcoal depending on the preference of the user. The programme nurtures entrepreneurs through successive stages to develop rural markets for introduction of the Jiko Matawi via the 5Is approach (See Table 1). The approach includes five stages of programme supports that combine technical and BDS training paired with access to non-monetised performance incentives.

Table 1: Improved Cooking Market Establishment - 5Is approach

Identification	Delivery of Market Intelligence to gauge supply and demand side dynamics;
Initiation	Stove camp training with artisans in Matawi production, costing, design refinement and initial marketing methods;
Incubation	Local supply chain relation building and onsite ICS enterprise coaching paired with the introduction of non-monetary performance incentives in the form of small production tooling-equipment and marketing tool supports (typically less than <200 EUR);
Investment	Emerging Champions are identified and availed access to individualized business development, marketing, and a medium sized one-time investment to assist production scaling (larger equipment, production site modernization <500 EUR);
Independence	Entrepreneur-led marketing supports stimulating market chain expansion.

2. Entrench market penetration of quality improved cook stoves in three markets from pioneering to expansion phases. As establishment approaches phase out, the programme will begin the roll out of innovative demand side supports to further stimulate the market along with shifting performance-based supports from smaller ticket, non-monetary supports to larger ticket items and financial incentives.

Planned Activities: The programme focuses activities on markets where there is demonstrated latent production capacity (ability to meet market peaks) amongst Champions with

strong potentials for consumer market engagement (high population density, general positive economic trends, etc). In these regions high density market district 'hubs' are identified in which the programme focuses efforts to local ward level (3-6 villages) market 'nodes' for the undertaking of demand-side BCC strategies promoting clean cooking products and practices at community event and door-to-door household awareness raising.

Demand stimulation delivered by community-driven BCC campaigns in market nodes is led by Clean Cooking Advocates (CCAs) who enable adoption of ICS through promotion of cooking, health, nutrition, and environmental practices. The programme will scale the messaging of BCC throughout the wider market hub by further employing social media video messaging and radio.

In parallel, the programme will mature its performance-based financing around successful cook stove Champions via access to higher ticket items necessary to scale stove production and distribution along with incremental financial incentive rewards based on quarterly unit sales. Qualifying Champions with sales demonstrating consistent annual growth towards 300-500 units monthly and possessing first stages of formalised business registration undertake one-on-one business growth planning with the supports of SNV and local consultants. Based upon their intended 5-year growth plan, qualifying enterprises are availed access to a one-time larger ticket item (such as small vehicles for transport of stove materials, advanced metal work machinery valued at >1,000 EUR) to kickstart actualization of their enterprise vision. Subsequent financial results-based incentives (RBIs) are awarded on a unit sales basis of ~1 EUR per stove that decreases annually over a 2-year period. RBIs are rewarded upon phone and onsite verification coordinated by SNV and upon evidence of reaching agreed quarterly benchmarks (such as persons hired, materials acquired-commissioned, etc) that are supportive to realizing the enterprises growth planning. Initial market testing of both demand side stimulation in BCC and maturing access to performance financing by SNV in 2020 has been positive with some producers realizing growth of 20-30% relative to their previous year's sales or that of the comparable market controls in the wider national producer roster.

3. Evolve market development in the two most developed regional markets<sup>72</sup> by conclusion of the programme in 2024. As these markets begin to move through expansion phases in the Entrench approach, the programme aims to diversify access to modern cooking options and strengthen national sector development.

Planned Activities: In the later stages of its BCC approach the programme will begin to integrate the promotion of e-Cooking products<sup>73</sup>. These products are beginning to make their appearance with wider acceptance in the most urban developed markets of Tanzania (such as Dar es Salaam). The programme will support their promotion in peri-urban and rural extents surrounding secondary urban localities of regional ICS hubs. Champions in these hubs, having graduated from the performance-based supports of the Establish and Entrench phases

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<sup>72</sup> The two markets in consideration for the Evolve activities are Mwanza and Morogoro seen in Orange on the map.

<sup>73</sup> E.g. pressure cookers, slow cookers, rice cookers.

of the programme, will transition to a final non-monetary incentive scheme that rewards e-Cooking products as an incentive to support them in expanding their business to e-Cooking.

The e-Cooking rewards will foster initial product entry for consumers to these markets from trusted cooking solution providers and act as a means for these enterprises to modernise and diversify their product offerings. The maturity of the enterprises will enable more advanced BDS supports focused on match making and relation brokering with reliable wholesalers and accessing short-term debt from commercial financing for stocks.

The programme will further representation of MSMEs in the cooking sector in national energy frameworks alongside TAREA. It will continue to support TAREA in its advocacy role to localise cooking energy agendas with PO-RALG while cementing the newly emerging lead ministry role of the VPO. In particular, the programme will place emphasis with VPO and PO-RALG to initiate articulation of realistic enforcement of the newly developed national ICS standard as gazetted by the Tanzania National Bureau of Standards in 2020 at local government and enterprise levels. This will be undertaken with TAREA to increase private-public engagement in the cooking sector and leverage the high potential to substantially expand scale of quality eligible products available in the country.

		Establish		Entrench		Evolve		
State of Market	MSME Orientation	Individual	Micro-Enterprise	Small Enterprise	Family Enterprise	Small Industrial	Med. Industrial	Company
	EAMD Phase	Pre-Commercial		Pioneering		Expansion		Maturity
	Avg. Market Sales / Month	<1,000		>2,000		>5,000		>10,000
Market Supports	Supply Side	Starter Materials	Results Based Incentives (RBI) (Non-Monetary Incent.)	Champion (TA + Asset)	Results Based Financing (RBF) (Monetary Incentives)	RBF Phase Out	RBI E-Cooking	Investment Ready Base Companies - Phase Out ICS Technical
	Demand Side	General Promo Materials (Fliers, etc)	Agent Match Making	Tailored Branding	Behaviour Change Communication (BCC)	BCC expansion E-Cooking		Broker commercial financing access.
	Enabling Environment	Localizing Standards (Producer Norms)	Localizing Reg. (LGAs)	Nat'l Multi-Stakeholder Collaboration Regulatory Advisory		Nat'l Multi-Stakeholder Collaboration - Policy Advisory		(Inter)national Stakeholder Coordination
Modalities	Primary	Training (Technical, BDS)		Evidence-Innovation - Demand Stimulation (BCC)		Evidence-Innovation (E-cook)		Partnerships-Alliances
	Secondary	Access to Finance (Non-Monetary)		Access to Finance (Monetary, BDS)		Policy Advice-Capacity Development		

Image: Overview Tanzania Cooking Market Development Approach (SNV 2021)

### Reason for approach

EnDev Tanzania aims to place the means for market development directly and flexibly into the hands of local enterprises and harness their ability to act as the drivers of their markets. Replication of the successful cooking programme to new and emerging regions in the up-scaling period is the logical next step to scale the uptake of ICS and ensure we leave no one behind throughout wider extents of Tanzania. The underlying performance-based nature of the programme has been responsive to identifying Champion enterprises essential to driving maturation in local markets while being conducive to supporting the development of women-led enterprises that currently account for 48% of ICS producers in the programme. As these markets develop, honing and tailoring market development supports via demand side actions, private sector financing, higher tier product access and regulatory development are necessary to facilitate a viable market maturation trajectory.

Building upon strong levels of gender parity, SNV has begun integrating PALS processes in its technical and BDS trainings. PALS works to bring all members of households together (the entrepreneur and their spouse) to unlock gender issues of decision making and economic control that may have been inhibiting further growth in women-led enterprise contexts. Initial results of PALS have been promising with some women-led enterprises demonstrating 10-20% sales growth post-training. SNV will refine PALS for wider integration throughout all of its implementation approaches.

### Effectiveness & Efficiency

Since the beginning of EnDev cooking in Tanzania in 2013, implementation costs have decreased relative to increases in results delivery. Since 2018, costs for results delivery are consistently on par or below EnDev global averages – despite significant geographic expansion of the programme. As markets mature, the programme will increase efficiencies by building on what is already established and investing more into fewer producers with proven potential to scale (Champions). Focusing BCC around these Champions and key local market nodes in surrounding communities to catalyse the development wider market hubs decreases operational costs but intensifies demand creation. Geographical expansion using our already proven and efficient stove market development model, targets areas that also leverage on SNV’s existing presence to reduce operational costs. SNV directly manages implementation of all performance-based incentives to ensure efficiencies in centralised procurement of quality goods and proper administration of any financial rewards.

## 1.17.6 Results

Project results		2021	2022	2023	2024
Technologies Disseminated (annual)	Matawi ICS	100,000	115,000	130,000	<b>140,000</b>
	e-Cooking	N/A	500	1,400	<b>2,100</b>
	Total Stoves	100,000	115,500	131,400	<b>142,100</b>
People: Access to Cooking (cumulative at close of each year) <sup>74</sup>		810,317	983,301	1,126,575	<b>1,250,229</b>

Based on EnDev OCS adjusted figures we calculate the People with Access to Cooking in the 2021-2024 phase as the delta between OCS at close 2020 and OCS at close 2024. Thus, the target for 2021-2024 phase is 670,438 people (1,250,229 less 579,791).

### Energising Lives

The intervention will focus to refining performance-based supply side supports coupled with innovate demand side stimulation for annual market sales of greater than 142,000 improved cook stoves and modern e-cooking technologies amongst rural and peri-urban families by close of 2024.

### Energising Opportunities

<sup>74</sup> Based on Adjusted Results figure from EnDev OCS.



The cooking programme will be expanded to stimulate an active national roster of 150 stove enterprises of which 110 are intended to reach viable local businesses (family enterprises) and medium scale formal operations (small-medium industrial /company) levels. Women-led enterprises will continue to be a driving force in the programme and will account for 50% of the programmes roster of ICS producers and product sales (currently 48%).

### **Energising Climate**

By conclusion of the programme in 2024, market activity will annually realize savings of 211,211 tonnes of firewood and 116,314 tCO<sub>2</sub>.

As of 2020, support of the programme to TAREA has contributed to advancement by the government to formally gazetting an ICS standard to ISO provisions. The programme flagship Matawi stove has been the first to undergo standard testing and certification which will be integrated to the renewed branding of the product. Capacity building supports to develop the ICS technical acumen, inform national tracking of consumer market and private sector dynamics, and broker coordination with relevant cross-sector players will be key contributions towards developing and strengthening a consistent national cooking sector platform amongst public and private players.

Design of the programme and results targets has been undertaken to reflect fluctuations in market activity due to COVID-19 implications in Tanzania. Declines of 10-20% in sales activity amongst enterprises that were noted in Q2 2020 rapidly recouped towards previous growth trajectories in the following quarter when suppressed demand recuperated as government restrictions and public concerns eased. This context is anticipated to continue throughout the pandemic.

## **1.17.7 Sustainability**

### **Financial sustainability**

Intakes to the programme are existing enterprises who enter the supports of the programme to establish the first phases of local market development for ICS. EnDev supports focus on increasing their growth and outreach. Focusing on increasing the production of existing suppliers, rather than generating a raft of brand-new businesses, reduces the risk that the businesses are not sustainable or financially viable. Additionally, whatever incentives are provided, be they in-kind or financial, they are not provided as pre-financing, but are earned based on verified performance – again ensuring that a business is financially sound enough to invest in its own expansion. All incentives are provided on an incremental performance basis and decline in value over time, ensuring that businesses can steadily build their own capacity to independently continue direct medium and long term investments in their enterprises via their own funds through the concluding Evolve stages of the programme.

### **Institutional sustainability**

Improved cook stove Champions are selected based on sound business criteria and from among businesses with a proven record, thus reducing the risk that we break a business before it is truly formed. Through our BCC approach, we ensure a match between increased production capacity and sales stability and increased demand. Building the capacity of TAREA as a sector advocate, leaves in place a sustainable association to continue

supporting an enabling environment and localised planning with local government offices through PO-RALG. This supports to change mind-sets at the local level in support of reduction of consumption of biomass. The programme will constructively work to develop the technical and market awareness capacity of VPO within the coordination and advocacy efforts of the programme as implemented by TAREA so as to bolster the role of VPO as the Biomass Cooking sector lead ministry. In this manner, the project is well positioned to identify critical issues in regulation and establish multi-stakeholder structures amongst the public sector that will outlive any specific programming and create an avenue for further advocacy and coordination.

### **Ecological sustainability**

Continued demand for and use of ICS stimulated through the BCC and ICS producers themselves ensures reduced use of solid biomass fuels for cooking (reduced deforestation and associated GHG-emissions) and aligns to GoT policy. Materials used in the fabrication of the majority of ICS promoted from the programme rely on local ceramics that can be easily disposed naturally in soils while with sourcing of clay from known and established sources. Metal materials in stoves can also be recycled through local metal collection services throughout Tanzania. E-Cooking technologies will be vetted for quality and sourced from suppliers with a minimum of take back schemes on electronic components while the programme will work in its enabling environment workstream to support continued development of e-waste supply chains with the GoT.

### **Technological sustainability**

Products promoted are appropriately designed technologies, aligned with Cooking Energy System (CES) quality levels, so that there is no break in supply side to producers once the project stops. The stoves promoted in the programme have been designed alongside rural women enterprises and subsequently refined through producer and consumer feedback throughout implementation since 2012. Through continued research and market intelligence, we will ensure that products are matched to market needs and we that products are continually vetted to maintain consistent quality and relevance to consumer needs. Producers newly onboarded in the programme are not formally added to the projects roster until 3-6 months post-initial training. Inclusion of their sales is only considered once they have been quality-control assessed on-site by SNV personnel. Only at this stage will units first become eligible towards earning incremental results-based incentives. The RBIs themselves are further rewarded upon spot checks to ongoing unit quality and/or visits and phone calls with actual household users. Through TAREA's work on quality control frameworks, we will support continued development of sustainable markets that are just entering to formalised product quality standards as of 2020. The programme has successfully provided units for testing to the national standard with the Tanzania Bureau of Standards and is working towards a functional means of localising standards at individual producer levels (product v. producer standards). We will extend works in e-Cooking to ensure supply sources are in line with national and international standards and that these units also provide adequate means for aftersales service including warranties for repair, replacement and takeback of malfunctioning units and/or those reaching their lifespan.

### **Social sustainability**

The BCC component is introduced to trigger permanent behavioural change around health and hygiene, nutrition and environment that also sustains the demand for and use of ICS. The same leadership and organisational structures that are put in place through community-driven improved cooking interventions can be further leveraged by the community to promote other community development initiatives. The supply side measures to improve the perceptions of women-led enterprises in a whole household PALS approach assists to advance the acceptance of improved roles for women. The combination of both measures feed directly to informing partners in enabling environment measures that gender is a central element to creating successful market contexts that unlock cross cutting benefits local economic development, health, and environment. This holistic approach of the programme provides a basis to practically expanding wider acceptance of cooking energy as an important development priority.

### **COVID-19 Impacts**

The GoT has been committed to policies since the advent of the pandemic to avoid market lockdowns given that the majority of the rural population rely on incremental, day-to-day market interactions for their survival in subsistence agricultural contexts. COVID-19 waves have been noted most strongly in the main urban centres with lessened impacts in rural context where the vast majority of ICS programme-supported producers reside. The combination of both factors has therefore seen markets enter a period of COVID-19 slowdowns, rather than complete cessations. These circumstances have to date been manageable amongst ICS enterprises given typical production settings engage 3-5 persons, distribution typically is within less than one day travel and the affordable nature of the stoves themselves (2-10 EUR). The programme further ensures safe implementation during the pandemic by providing access to PPE for personnel and workshop participants, responsively reducing training sizes to allow for sufficient social distancing, shifting training methodologies to include a higher ratio of one on one coaching and utilizing bulk SMS service for communication and some monitoring activities with project participants. Potential increases in costs to ensure safe implementation (such increased training frequency due to decreased group sizes, PPE expenses, etc.) have been adjusted in the programme budget and through 2020 adjustments to implementation have not impacted the quality of service delivered to participants and beneficiaries.

### **Exit & Handover Strategy**

The EnDev programme in Tanzania initiated in 2013 with operations in a single region of Tanzania. Through its duration it has worked to effectively refine its approaches through widening extents of the country. The programme has been conducive to encouraging the growth of enterprises to self-sustaining sales volumes as growth is driven by the enterprises themselves. As the programme moves towards more direct market development on the demand side and enabling environment, the underlying aspect of the programme to work with existing dynamics and players will be maintained. All incentives in the programme are designed to stimulate first-movers and decline in value over time as players successively scale their operations to more advanced market approach phases where requirements for larger investments are more complex. Additionally, as SNV is working on both the supply side and demand side of market growth through the ICS producers themselves, the capacity to supply and continue to generate demand remains after the project ends. As markets pass through the evolve stage of programming they will be considered to have effectively 'graduated' from the range of programme supports presently available.

### 1.17.8 Gender Strategy and Safeguards

Our overall approach is to build on SNV's proven models to ensure the programme builds to gender equality and empowerment. Through 2013-21 implementation of EnDev in Tanzania, a rich disaggregated results database of private sector performance has been derived with evidenced linkages to gender sensitive programme delivery in both cooking and electrification programming. These will form a valuable basis alongside quality (inter)national gender-energy data sets for articulating a renewed gender analysis and strategy to the measures that is strongly evidence based.

Women-led stove production enterprises play a crucial role in the programme – women-owned businesses account for 48% of the projects producer base while consistently delivering at least 50-55% of annual recorded Matawi sales.

Building upon this dynamic, in the 2019-21 the programme worked to increase decision-making power and control of resources for advancing female leadership as owners and operators of firms using SNV's PALS and our Balancing Benefits methodologies. In 2022-24, we will advance PALS training to build constituency for female leadership and develop gender responsive market systems as women-led enterprises continue to scale. The key outcomes of PALS workshops are the setting of a family vision for a happy life and the setting of business targets to reach the larger, more holistic view of the family and how the cook stove business (and other income generating activities) can contribute to achieving this vision. Many times, the entrepreneur and spouse agree on new divisions of labour in the household or new ways to invest in the cook stove business to reach their goals. Other outcomes include less measurable concepts like changes in gender norm perceptions within the household and reflecting on cultural stigmas and how by shifting some of these the family could be happier and more successful as a whole. While we have a small sample size, we observe that a majority of women-led enterprises that go through PALS training experience a growth in sales post-training. To sustain these gains post-training follow-up will be strengthened, and more high-touch support offered by the project Gender Specialist.

These approaches will also be used in the new programme to focus within the BCC activities in training women as CCAs and in improved kitchen construction, a job that would typically be considered man's work, but that may be done with even more contextual knowledge by women who are generally the cooks of the family (strategic needs). The CCA elements of the programme further provide a basis to evidence the viability in local markets for employment opportunities in marketing ICS rather than only stove production. Particularly in markets wherein the stove production is more strictly oriented to metal working (that is more often male dominated) and local clay qualities are lower (and hence limited to standalone ceramic production dominated by women), expanding roles in marketing and sales open opportunities for the participation of women in cooking markets.

EnDev Tanzania will coordinate with relevant Ministries currently developing the Gender Action Plan (GAP) for Tanzania including the Ministry of Energy (MoE). The MoE has partnered with Tanzania Gender and Sustainable Energy Network (TANGSEN) to contribute to the GAP with a focus on clean cooking and electrification. Through the enabling environment

work with TAREA the programme will ensure MoE and TANGSEN are engaged in clean cooking stakeholder groups and advocacy work. EnDev will also support TANGSEN's efforts to incorporate clean cooking planning into district level frameworks.



Findings from the Gender Analysis conducted in December 2020 indicated that the SNV EnDev Tanzania team, while having a predominantly male field staff, have women in leadership positions including the Programme Manager/Sector Leader and the leader of the BCC workstream. Women in leadership roles and gender diversity in a project leadership pool means greater diversity of thought, which leads to improved problem solving and results achievement. One key recommendation is for the team to designate a gender focal person more formally amongst the field level personnel to further embed gender priorities amongst the team. In the 2022-2024 phase SNV will implement this recommendation. The Gender Analysis report further recommends to roll-out PALS training to more producers while also developing a tailored curriculum specifically for male producers which encourages them to become agents for change in their communities when it comes to Gender Equality. On the BCC component the Gender Analysis suggests that there should also be a role for men in the CCA programme. With regard to the enabling environment approach the Gender Analysis recommends that the Ministry of Health, of Community Development, Gender, Elderly and Children (MoHCDGEC) be further imbedded into the policy and advocacy working group led by the VPO. The Project will start to implement on these recommendations and bring them forward into the extended Gender Action Planning exercise that will take place with a Gender Expert from Energia starting in 2021.

For all SNV partners, including cook stove enterprises, SNV already obliges that suppliers and partners formally comply with safeguarding requirements – ensuring through our due diligence processes that players implement policies on prevention of child labour, discrimination, sexual harassment, and trafficking. Amongst informal ICS enterprises, the programme will introduce relevant elements throughout its technical, BDS and PALS training. SNV will expand this to include appropriate management of e-waste such as takeback/refurbishment schemes and battery disposal streams that are in progressive development amongst the largest commercial players. This area will also be explored by TAREA with a view to developing an advocacy strategy as part of the enabling environment interventions in the programme.

An Integrated Peace and Conflict Analysis (IPCA) will be performed for EnDev Tanzania by a global consultant. The IPCA will define the main factors of conflict, fragility and violence in the country affecting the project as well as mitigation measures, external risks, and impacts.

# 1.18 Uganda

## 1.18.1 Summary and key data

Promoted technologies	 		
Summary of proposed interventions(s)	<p><b>Markets</b> for OGS and ICS for Ugandan and refugee HH, PUs and SIs will be developed by strengthening the enabling environment as well as the supply and demand side. Market-based incentives for the private sector (RBF), policy advice and BDS are core approaches. Awareness campaigns will increase demand and leverage impact of private sector marketing activities supported by EnDev. Interventions will be gender sensitive and create options for gender transformation. <b>BDS/Training</b>: Based on in-depth assessments, tailor-made BDS and production infrastructure support will increase <b>resilience</b> and sustainable <b>growth</b>, improve <b>quality</b> and adherence to <b>standards</b>. Associations benefit from advisory and organisational development support, including trainings. <b>Access to finance</b>: BDS will support the development of project proposals and <b>investment readiness</b>. EnDev will link OGS PAYG companies to the <b>credit reference system</b>. <b>Evidence/ Learning/ Innovation</b>: Evidence is gathered and produced in baseline and impact studies, surveys and knowledge exchange. The learning journey entails constant improvements of approaches based on learnings from previous interventions, other stakeholders and new developments. Learnings are transferred to others for up-scaling. <b>Policy Advice</b>: EnDev Uganda supports the improvement of <b>framework conditions</b> for market-based access to OGS and ICS by <b>advising</b> the Ministry of Energy and Mineral Development (MEMD), UNHCR, associations and other key stakeholders in <b>policy</b> development/review processes, <b>standards</b> implementation, establishment of a PU cluster, advocacy and <b>gender</b> mainstreaming. <b>Partnerships</b> with key stakeholders in government, private sector and civil society, e.g. sector working groups, MEMD, UNHCR, associations, DPs, companies and others are the core platform for mutual <b>learning, transfer of approaches</b> for upscaling and <b>innovation</b>.</p>		
	Quantitative targets [# of]		Further relevant impacts/outcomes
Energy for lighting / electrical appliances in households	32,033	People	<i>Only for refugees and host communities including Pico PV &amp; SHS</i>
Cooking / thermal energy for households	448,077	People	<i>Partially for refugees and host communities, small pilot on e-cooking</i>
Electricity and/or cooking / thermal energy for social infrastructure	547	SI	<i>Including higher tier systems in refugee settings</i>
Energy for productive use / income generation	1,335	MSMEs	<i>Including pilot targeting female entrepreneurs in refugee settings</i>
Project period	01.01.2021 – 31.12.2024	Indicative budget	EUR 5.4 mio

## Solar Component

### Summary of interventions

EnDev Uganda will increase market-based access to OGS systems for PU and SI through performance-based partnerships with solar distributors, and complement this support with BDS, awareness creation measures to raise demand and by fostering an enabling environment. EnDev will support MEMD, USEA and other relevant stakeholders to improve framework conditions for OGS market development. Additionally, USEA will be supported to establish a competence cluster for PU. In refugee settings, EnDev will respond to protracted crises that call for a humanitarian, development and peace nexus approach building on lessons from EnDev's past programming. This will be done by upscaling market-based access to OGS for households and PU via energy kiosks and the RBF-supported establishment of delivery chains which has proven to be promising to create market-based access to quality energy products and services in displacement settings. EnDev will furthermore develop replicable OGS packages for SI including O&M schemes.

### Outcomes, impacts and results

The interventions will increase awareness of, access to and adoption of stand-alone off-grid solutions for productive users, social institutions as well as remote and refugee HHs. EnDev's support to the OGS companies will play a critical role, on the one hand, in ensuring the long-term sustainability of OGS business models. On the other hand, improved access to OGS will lead to increased HH savings, improved access to modern health services specifically improving 24 hours emergency and maternity services (e.g. resulting in conducive preconditions for improved maternal and neonatal health outcomes), access to solar energy for schools for improved learning and teaching conditions. Additionally, it will improve gender equality and women empowerment, increase income and job creation and thereby energise opportunities and lives. The interventions will be critical in reducing greenhouse gas emissions (energising climate). At policy and sector level, EnDev's interventions will contribute to a more prominent consideration of OGS in policies and sector strategies. Sector organisations will be supported to improve coordination, advocacy and services to the private sector. Overall, the component will facilitate access to electricity for 113,053 people, 1,307 SI and 1,782 MSMEs by the end of 2024 including specific targets for female entrepreneurs and refugee & host communities.

## Cooking Energy

### Summary of interventions

EnDev Uganda will support local manufacturers and distributors of ICS to improve and up-scale their production capacity and distribution outreach across Uganda through RBFs, production infrastructure support and BDS. Sales up-scaling will target household and PU stoves. To improve the enabling environment and framework conditions for cooking energy market development, EnDev will support MEMD, UNACC, UNBS and other stakeholders to update policies and strategies, improve sector coordination, implement awareness campaigns and improve advocacy and standards implementation.



In refugee settings, EnDev will upscale market-based access for ICS, support the establishment of private sector delivery chains using energy kiosks and result-based financing mechanisms as well as create demand.

#### Outcomes, impacts and results

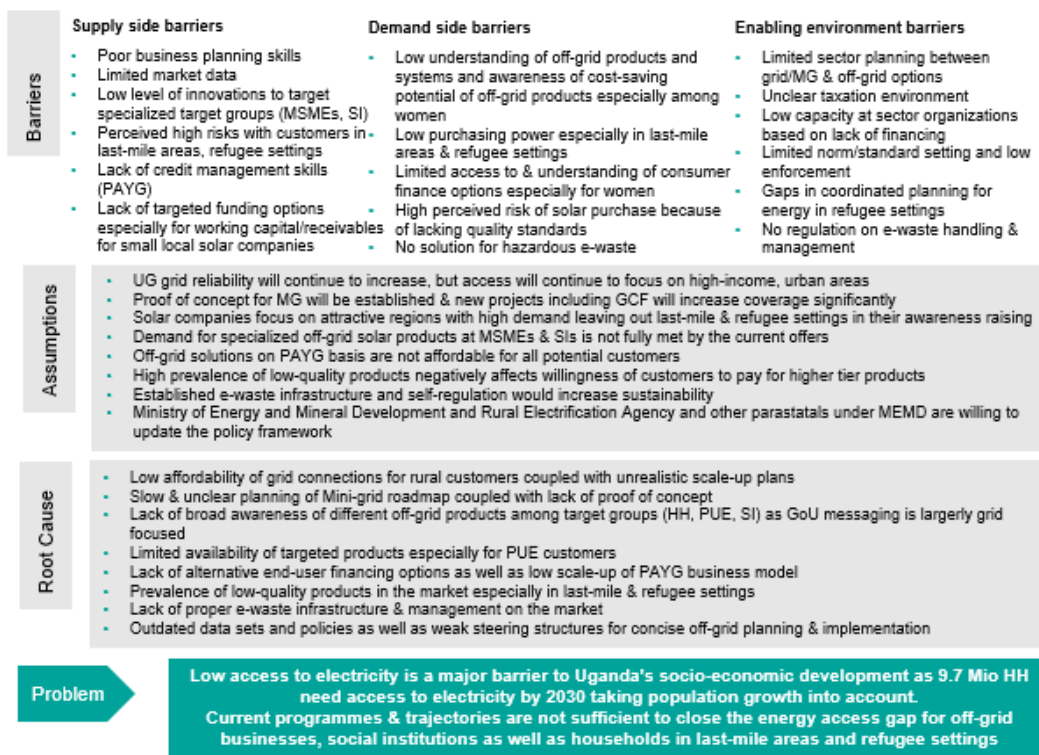
The interventions will significantly increase awareness of, access to and adoption of ICS at HH and PU level, including for refugee communities. The support to the private sector will lead to increased productivity, standards compliance, and formalization at SME level, additional jobs and income generated through RBFs and PU ICS, economic empowerment of women and thereby energising opportunities. Social development will be enhanced as the HH will manage savings, health and gender equality improved. The reduction of harmful climate emissions through inefficient cooking practices and technologies will be reduced and climate change combated. At policy and sector coordination level, EnDev's interventions will contribute to a more prominent consideration of the need to further develop the market for ICS and identify alternative fuels in policies and sector strategies. Sector organisations will be supported to improve coordination, advocacy and services to the private sector.

Overall, the component will facilitate access to modern cooking technologies for 1,259,183 people and 548 MSMEs by end of 2024 including specific targets for refugee & host communities.

## 1.18.2 Theory of change (ToC) and state of market

### Theory of Change – EnDev Uganda - Solar

Impacts	<b>Energising Lives</b> <b>Social development</b>	<b>Energising Opportunities</b> <b>Economic development</b>	<b>Energising Climate</b> <b>Combating climate change</b>
	<ul style="list-style-type: none"> <li>Increased HH savings especially for customers in last-mile areas and refugee settings</li> <li>Improved lighting for schools</li> <li>Improved modern health services at health centres in refugee settings</li> <li>Improved gender equality</li> </ul>	<ul style="list-style-type: none"> <li>Improved income &amp; job creation at MSMEs</li> <li>Increased job creation &amp; resource mobilization for solar companies</li> <li>Improved economic empowerment by women</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to GoU climate/GHG emission targets</li> </ul>
Assumptions	<ul style="list-style-type: none"> <li>Business growth at solar companies is sustainable (including environmental sustainability through proper e-waste concepts)</li> <li>Transitioned customers properly use the systems and have sufficient funds for O&amp;M</li> <li>Development of Operation and Maintenance Plans and increased commitments lead to higher share of functional and durable solar installations at SIs</li> <li>Reduced default rates will encourage solar companies to expand their distribution networks further reaching customers in last-mile areas &amp; refugee settings</li> <li>MEMD, REA, ERA, MoES and other government entities possess necessary capacities for planning, budget &amp; implementation</li> <li>Proper training and auxiliary services are available for PUE users allowing for increased income &amp; productivity</li> <li>Increased awareness among customer encourages self-regulation among solar companies</li> </ul>		
Outcome	<p><b>Ind. 1:</b> High uptake and adoption of suitable access solutions at households in last-mile areas and refugee settings // Off-grid solutions are prominently included in electrification strategies and implementation strategies // Higher uptake of quality, certified solar products through informed customers</p> <p><b>Ind. 2:</b> Budgeting and implementation at Ministry of Education to include off-grid solutions for schools</p> <p><b>Ind. 3:</b> Higher uptake of targeted PUE packages by smallholder farmers and MSMEs // Increased productivity at MSMEs using solar energy products</p> <p><b>Ind. 4:</b> Solar companies use market intelligence, training &amp; financing options to grow their businesses &amp; create jobs // Decreased customer default rates and lower risks for solar distributors in new areas increase business &amp; job sustainability</p>		
Assumptions	<ul style="list-style-type: none"> <li>Solar companies receive sufficient funding to improve their business models</li> <li>Consumers in last-mile areas and refugee settings are willing to invest into off-grid solar solutions</li> <li>Stakeholders in the off-grid solar &amp; finance sector are willing to invest into the implementation of end-user finance pilots</li> <li>Ministry of Education and other stakeholders support the transition to off-grid energy</li> <li>Target PUE market intelligence, training and support options can be transformed into increased sales</li> <li>Key stakeholders within the energy sector champion off-grid energy solutions</li> <li>Increased awareness at customer level translates into technology adaption</li> </ul>		
Outputs & Results	<ul style="list-style-type: none"> <li>Solar companies received support to improve product offering, targeting &amp; business model sustainability</li> <li>Increased availability of quality off-grid solar products targeted to MSMEs, SIs, last-mile HH &amp; within refugee &amp; host communities</li> <li>Proof of concept established for CRS linkage for PAYG &amp; affordable end-user finance schemes in refugee settings</li> <li>Information about the benefits of the electrification of Primary Schools available GoU and donors</li> <li>Solar companies have access to market intelligence, training and support options for PUE products</li> <li>Off-grid solutions and voices are well represented at national policy development</li> <li>Knowledge and awareness about quality solar products has increased among women and men</li> </ul>		
Key interventions	<p><b>[Training, Business development, hardware]</b> - Individualized training &amp; coaching approach addressing critical BDS needs (strategic, operational &amp; financial), Building of energy hubs/ market places in refugee settings that include energy kiosks and other opportunities for PuE with specific focus on women, Electrification of SIs in refugee settings as basis for scale by other humanitarian, development and peace actors</p> <p><b>[Access to finance]</b> Targeted Results-based financing incentivizing sales to MSMEs, SIs, and for refugee, host community and last mile HHs including female headed HHs, Piloting innovations in end-user financing (including CRS linkage for PAYG &amp; affordable schemes in refugee settings)</p> <p><b>[Evidence, learning transfer &amp; innovation]</b> Verification, schools baseline study, impact analysis &amp; knowledge management, PUE Competence cluster at the sector association supporting trainings, market intelligence, quality standards &amp; innovation</p> <p><b>[Policy advice &amp; capacity development]</b> Continuous support for off-grid policy development and implementation including for the refugee context, Capacity support for the sector association, Awareness campaigns highlighting the benefits of quality off-grid solar products for HH, SIs and MSMEs</p> <p><b>[Partnership and alliances]</b> Piloting of innovative Financial Sector Development partnership (including credit reference system linkage)</p>		



## Solar Sector

Markets for tier 1 & 2 SHS including small-scale appliances are mainly in expansion phase with specific market development variables in the piloting and maturity phase. Low access to electricity (28%), particularly in rural areas (16%) remains a major barrier to Uganda's socio-economic development as 9.7 Mio households (HH) need access to electricity by 2030, taking into account the high population growth (3.6% annually) and over 1.4 million refugees. Root causes for this include lack of awareness, affordability & availability issues as well as prevalence of low-quality products. Significant gains were made in generation capacity, extension of transmission and distribution infrastructure and urban grid connections, but many rural HH still lack uninterrupted access to lighting, basic HH appliances as well as opportunities for productive use of energy (PUE) for example in agriculture, service & retail as well as value addition through agro-processing. Additionally, low electrification rates limit the service delivery of rural schools and health centers. Initial market-based initiatives to increase access to solar OGS with instalment options in refugee settlements have shown that refugees are as reliable customers as Ugandans living in the rural areas. The COVID-19 pandemic and the corresponding restrictions impacted the solar sector, where direct customer contact, public awareness activities and access to reliable, cheap transportation options are critical: Sales' drops of over 50%, 50-75% reduction in repayment of PAYG products, significant cash-flow challenges and halted or postponed scale-up activities. Already existing supply side barriers in the sector have increased through the pandemic where limited investment readiness, poor business planning skills or limited market data hinder the progress of companies. The need for stand-alone OGS solutions to complement mini-grid and grid activities remains strong with national planning estimating the potential at over 60% of unconnected HHs. EnDev Uganda's interventions will address key barriers on supply-side, demand-side as well as

enabling environment identified in this ToC to scale-up reliable energy access particularly for households in remote areas and refugee settings as well as productive users and social institutions. Intervention areas were chosen taking into consideration the activities of other actors in the field as highlighted in the Collaboration chapter, particularly in the areas of quality standards, enabling environment & awareness raising. Therefore, EnDev Uganda will:

- Capacitate solar companies (including a mix of larger international & smaller local players) and energy hubs through targeted BDS<sup>75</sup> as well as hardware support in order to achieve improved operations, higher bankability and access to finance for companies
- Incentivize companies to target underserved markets like MSMEs, schools, last-mile HHs and refugee settings through results-based financing (RBF) programs while supporting with awareness activities and development of end-user financing options
- Support companies in the PUE segment by establishing a competence cluster located at and developed jointly with USEA<sup>76</sup>
- Support policy development, implementation of quality standards, sector coordination and public awareness for OGS, including refugee settings
- Pilot the innovative Financial Sector Development partnership in Uganda,
- Implement the Smart Communities Coalitions Innovation Fund (SCCIF)

These interventions will not only increase awareness of, access to and adoption of stand-alone off-grid solutions for remote and refugee HHs but also contribute to increasing HH savings, access to modern health services, gender equality as well as income increase and job creation at MSME level. In addition, the interventions will be critical in reducing greenhouse gas emissions as well as playing a critical role in ensuring the long-term sustainability of OGS business models.

*Currently, it is assumed that refugee figures will further rise and only few refugees will return to their home countries. The Global Compact on Refugees calls for support to host communities and refugees to live productive lives. EnDev Uganda includes refugee energy needs into the design of demand, supply and enabling environment approaches of both sectors, cooking and solar.*

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<sup>75</sup> Business Development Services

<sup>76</sup> Uganda Solar Energy Associations

## Theory of Change - EnDev Uganda - Cooking Energy

Energising Lives - Social development	Energising Opportunities - Economic development	Energising Climate - Combating climate change
<ul style="list-style-type: none"> <li>i) Increased HH savings including in refugee settings</li> <li>ii) Improved health (HH)</li> <li>iii) Improved gender equality</li> </ul>	<ul style="list-style-type: none"> <li>i) Increased SME income and productivity</li> <li>ii) Improved economic empowerment for women especially female entrepreneurs</li> <li>iii) Increased resource mobilization</li> </ul>	<ul style="list-style-type: none"> <li>i) Strengthened climate change resilience of beneficiaries</li> <li>ii) Contribute to GoU climate/GHG emission targets</li> </ul>
<ul style="list-style-type: none"> <li>i) Suitable high-quality technologies become more accessible, producers and distributors enter market/increase market penetration, economies of scale and affordability improve</li> <li>ii) Users adopt and sustainably use the clean cooking solutions and companies integrate appropriate business practices to continue to sustainably upscale operations and outreach</li> <li>iii) Increased innovation, market penetration and awareness of ICS for PuE and higher tier cooking solutions e.g., e-cooking</li> <li>iv) Companies benefit from improved framework conditions and stronger strategic collaboration between sector associations, their members and relevant sector stakeholders</li> </ul>		
<ul style="list-style-type: none"> <li>i) Increased adoption of modern cooking technologies and services for HH and SMEs including in refugee settings</li> <li>ii) Improved prioritization of measures for access to modern cooking energy in policies and strategies</li> <li>iii) Increased job creation at both stove MSMEs and PuE ICS users</li> <li>iv) Sector coordination, advisory services, and advocacy roles are strengthened</li> <li>v) More market information available allowing for including increased market penetration of high-quality ICS, higher tier ICS (e.g., e-cooking) and alternative fuels are available in the market including in refugee and host communities</li> </ul>		
<ul style="list-style-type: none"> <li>i) Cookstove/Fuel MSMEs can attract funding, improve business models/practices and production techniques, and their ICS models are compliant to relevant standards</li> <li>ii) Data and skilled personnel are readily available and linked to relevant opportunities or sector players</li> <li>iii) HH, SMEs adopt and use the modern cooking technologies and services</li> <li>iv) Incentive payments and financing modalities are well allocated and utilized</li> <li>v) Value chain for PuE and higher tier ICS develops, and SMEs become more aware of benefits, accessibility, affordability, etc.</li> <li>vi) Relevant Sector associations harmonize strategic agendas, effectively serve members, and advocate for MEMD to set inclusive priorities</li> </ul>		
<ul style="list-style-type: none"> <li>i) Increased # of Stove semi-industrial and efficient stove MSMEs which have increased distribution outreach, formalize and employ sustainable business practices, comply with stove standards, increase PuE ICS market penetration</li> <li>ii) Increased # of ICS purchased and sustainably used by HH and PuE for SMEs in Uganda</li> <li>iii) Increased ICS availability across multiple regions and market segments (HH and PuE for SMEs) in Uganda,</li> <li>iv) Increased awareness on benefits of efficient cooking technologies among Ugandans</li> <li>v) Relevant strategies and policies are updated and cooking energy topics/needs are well represented,</li> <li>vi) Better coordinated association landscape attracts funding and strengthens advocacy and representation for members,</li> <li>vii) Improved sector knowledge management, enhanced testing capacity and standards compliance</li> <li>viii) Increased market intelligence on higher tier ICS and appropriate pilot offers additional upscale potential and lessons learned</li> </ul>		
<p><b>Increasing access to modern cooking technologies, improving distribution outreach, access to finance</b></p>		
<ul style="list-style-type: none"> <li>i) Targeted results-based financing for stove companies (MSMEs) with incentives for providing ICS access to HHs, and PuE users by food vending businesses (restaurants, canteens, small hotels, bakeries) and for refugee and host community areas, including female-led PuE businesses</li> <li>ii) Building of energy hubs/marketplaces in refugee settings including energy kiosks and opportunities</li> </ul>		
<p><b>Business Development, Investment Readiness, Upscale Potential and Resilience</b></p>		
<ul style="list-style-type: none"> <li>i) Identifying critical BDS needs of stove MSMEs (strategic, operational, financial) and providing targeted BDS support through training, coaching, mentoring, etc.</li> </ul>		
<p><b>Production Capacity and Infrastructure</b></p>		
<ul style="list-style-type: none"> <li>i) Supporting Stove MSMEs with technical production infrastructure assessments with recommendations for improvements and improved production efficiency, ICS quality, and boost number of stove SME compliant with UNBS stove standard</li> </ul>		
<p><b>Policy advisory, Sector Coordination, Standards Implementation (Capacity Development)</b></p>		
<ul style="list-style-type: none"> <li>i) Continued strategic input into relevant GoU/MEMD energy policy and review processes including in the refugee context</li> <li>ii) Support to strengthen capacity of sector association secretariat and related coordination and advocacy role</li> <li>iii) Implementation of awareness campaigns focusing on benefits of high-quality cooking technologies and services for HH and PuE for SMEs (food vending businesses)</li> </ul>		
<p><b>Partnerships and Alliances</b></p>		
<ul style="list-style-type: none"> <li>i) Knowledge exchange on best practices, lessons learned and market intelligence on PuE, RBF etc. with CLASP, World Bank, UNDP</li> </ul>		
<p><b>Evidence, Learning Transfer, Market Intelligence</b></p>		
<ul style="list-style-type: none"> <li>i) RBF Verification, knowledge exchange missions, impact studies and innovation/communication products</li> <li>ii) Piloting higher tier access projects, approach or market study in cooperation with relevant actors e.g., for e-cooking</li> </ul>		
<p><b>Supply side barriers</b></p>	<p><b>Demand side barriers</b></p>	<p><b>Enabling environment barriers</b></p>
<ul style="list-style-type: none"> <li>i) Limited distribution outreach and infrastructure</li> <li>ii) Poor production techniques and prevalence of low-quality products from lack of access to raw materials and low innovation levels</li> <li>iii) Low capacity of business development limiting upscale potential</li> <li>iv) Lack of knowledge on PuE market and suitable strategies</li> <li>v) Limited suppliers of higher tier ICS, and PuE ICS in the market</li> </ul>	<ul style="list-style-type: none"> <li>i) Lack of awareness of benefits of modern cooking technologies and standards, as well as healthy cooking practices</li> <li>ii) Lack of access to high quality and affordable energy efficient cooking technologies, especially in very rural areas and refugee settings</li> <li>iii) Limited access to suitable end-user financing schemes</li> </ul>	<ul style="list-style-type: none"> <li>i) Lack of up-to-date strategies and policies with implementation and budgeting for clean cooking sector</li> <li>ii) Poor coordination and steering mechanisms of sector associations and relevant es-MDAs for adequate advocacy</li> <li>iii) Limited implementation, and awareness of enforcement of stove standards</li> <li>iv) Limited sector knowledge management, provision of information and up to date market intelligence</li> </ul>
<ul style="list-style-type: none"> <li>i) Lack of knowledge on efficient and sustainable stove and fuel production techniques.</li> <li>ii) Limited distribution infrastructure with most production and distribution of improved cooking technologies is based around central Ugandan region thus limiting market penetration and adoption in more rural areas and seen as high risk in refugee/hosting areas.</li> <li>iii) Low priority of cooking energy topics by GoU in Energy Policy Frameworks and Policies.</li> <li>iv) Weak sector steering and coordination mechanisms limit advocacy effectiveness</li> <li>v) Limited availability of suitable alternative cooking fuels and technologies especially for PuE</li> <li>vi) Limited affordability and awareness of modern cooking technologies more efficient technologies</li> <li>vii) Limited availability of market intelligence and market responsive data especially for PuE, higher tier cooking energy access, and skilled personnel</li> </ul>		
<ul style="list-style-type: none"> <li>i) The continued over dependence on biomass for cooking fuel</li> <li>ii) Poor production techniques and capacity, as well as prevalence of low-quality products on the market</li> <li>iii) Lack of awareness on clean cooking technologies and practices</li> <li>iv) Limited affordability of modern cooking technologies and services</li> <li>v) Poor distribution outreach limiting access and market penetration of ICS in underserved regions especially rural areas and refugee and host communities</li> <li>vi) Informal nature of the sector and low business development capacity of sector players limit upscale potential, investment readiness and resilience.</li> <li>vii) Poor sector coordination and policy advocacy from fragmented sector association landscape.</li> </ul>		



## Problem

viii) Slow implementation and limited awareness of stove standards;

Limited access to **modern cooking solutions and services for Ugandans** with growth in adoption still too low, thus significantly limiting social and economic development. Limited access to modern cooking solutions and services for Ugandans with growth in adoption still too low, thus significantly limiting social and economic development. The Uganda National Development Plan III (2020-21 – 2024-25) has a target of reducing the share of biomass energy used for cooking from 88% in FY2018/19 to 50% and increasing the share of clean energy used for cooking from 15% in FY2018/19 to 50%, including in refugee and host community settings.

## Cooking Energy Sector

The market for ICS is mostly in expansion phase, with specific variables (rural and refugee settings) in piloting phase and few others in maturity phase. According to the Biomass Energy Strategy (BEST), less than 10% of Ugandans have access to clean and efficient cooking technologies with most HH relying on biomass, and less than 1% owning higher tier stoves. Efforts to shift towards alternative fuels and other cooking technologies are still in its infancy. To reach universal access by 2030, BEST estimates 5.4 million HH in need of wood and charcoal ICS. With a lifespan of 2-3 years, the Ugandan household ICS market can be estimated at 20.2 million units until 2030. Production and distribution capacity of ICS companies have increased over the last years but are still limited with only few semi-industrial MSMEs with significant production capacity of higher-quality ICS. Compliance to the newly passed UNBS National Stove Standard (2019) has been slow. The mostly informal ICS companies lack structures, capacities and incentives to innovate and upscale. They are characterized by fragile business models, low margins and widely inexistent access to finance. The institutional landscape is fragmented with sector associations having limited advocacy power. In addition, on the demand side, there are still low levels of awareness on the benefits of good quality cooking technologies. The impacts of the COVID-19 pandemic and related restrictions have significantly affected ICS MSMEs with over 60% reporting more than 50% drop in sales, limited cash flow and staff layoffs. This has significant implications on previous cooking energy access achievements, and jeopardizes future growth in a sector. EnDev Uganda's interventions will address key gaps in framework conditions as well as demand and supply, targeting ICS access for HH and PU, including refugee settlements:

- Support stove SMEs' resilience and sustainable growth by offering BDS for improvement of business operations, investment readiness and scope of sales
- Increase up-scaling of sales outreach through supporting the SMEs' enhancement of production and distribution capacity, and compliance with the UNBS National Stove Standard
- Incentivize companies to target underserved markets like HH, MSMEs and refugee settings through results-based financing (RBF) programs<sup>77</sup>
- Support policy development and sector coordination, incl. in refugee settings
- Boost demand for ICS through awareness campaigns, market activations, popularization of the UNBS stove standard, incentivising ICS companies in refugee settings to offer flexible payment options.

EnDev's support is expected to increase the solidity of ICS companies, that qualifies them to develop bankable proposals or obtain support from organisations that offer larger financial

<sup>77</sup> Independent verifications of previous EnDev RBFs have indicated an 89% success rate in reaching customers via REBF and through decentralized hubs. They have demonstrated more sustained adoption with 100% user transition to ICS promoted under RBFs from previously used traditional cooking methods due to user training and after sales service requirements included in the RBFs. In addition, companies can apply for the RBF as a consortium enabling smaller SMEs to access financing and leverage implementation and collaboration strengths across consortium member partners.

ticket sizes. In addition, the focus on reaching the underdeveloped PuE ICS segment through RBFs provides options to diversify HH income. These interventions will contribute to increased HH savings, gender equality as well as income increase and job creation at MSME level. In addition, the interventions will be critical in reducing greenhouse gas emissions as well as playing a critical role in ensuring the long-term sustainability of ICS business models.

### **1.18.3 Transformative character**

#### **Solar Sector**

The OGS sector has seen increasing interest, market entries and growth. Nevertheless, growth has not yet reached a mature level as both long-term sustainability as well as inclusivity of all customer segments and reach still lack behind expectations. In its solar component, EnDev Uganda will therefore focus on increasing access beyond easy to reach customers namely for HHs in last-mile & refugee settings as well as for PUE and social institutions (SI). This targets transformation in the following areas:

#### **Market development**

To improve the sustainability and scale-up of existing business models (supply side) and thereby contributing to market development, EnDev Uganda intends to fill key gaps on both, supply and demand side of the OGS market. Companies will be strengthened internally by improving their operations and resilience, as well as externally by supporting them to venture into previously untapped markets and thereby achieving access goals and general OGS market development. Actions will include tailor-made BDS, piloting customer credit management, implementing RBF, creating awareness and in refugee settings, supporting market development with more articulate and adapted support mechanisms, including developing options of enhancement of financial services for customers. Policy advice and sector support will foster the enabling environment for market development.

#### **Economic development**

Economic development approaches aim to achieve income and employment through energy access. For that, EnDev Uganda will focus on the promotion of PUE solutions through gender-sensitive country-wide RBF approaches, the set-up of energy hubs in refugee settings, the promotion of a PUE cluster for solar companies, and up-scaling solar product uptake among smallholder farmers, leading to increased resilience, including for women and youth.

#### **Social development**

EnDev Uganda aims at fostering social development by supporting market development that enhances energy access to social institutions. EnDev will support companies to sell affordable OGS solutions (including higher tier solutions) to SIs, tied to attractive financing solutions. Experience shows that this approach attracts both privately run schools, which have access to finance but need to be targeted directly by companies, as well as government run schools, for which energy budgets at Ministry of Education level are currently discussed. The project will gather data about the effects of OGS electrification on the service provision of SIs, including those supported in refugee settlements, providing evidence for a stronger



engagement of GoU<sup>78</sup> and its partners. In refugee settings, EnDev will share lessons learnt (including gender-focused approaches) enabling GoU not only to guide humanitarian actors but also attract private sector and development partners.

### **Poverty alleviation**

EnDev Uganda is committed to ensuring that our market-based energy access approach leaves no one behind. Our refugee programming will further pilot and build upon lessons from earlier innovations that lead to HH savings in expenditures or time. Additionally, the Last-mile RBF, co-financed by USAID and SDC, will pilot an innovative way of targeting previously unreachable last-mile HH customers by de-risking companies when expanding operations to very remote areas.

### **Cooking Energy Sector**

In Uganda, ICS producers and distributors operate largely in the informal sector and few companies have transformed their rudimentary production methods and qualify as “semi-industrial” or can improve distribution outreach to scale adequately to serve the demand.

### **Market development**

EnDev interventions aim to increase the number of formalized, semi-industrial cookstove SMEs operating in the market, that upscale sales and are investment ready, have bankable proposals and that offer consistent high quality and quantity of affordable UNBS National Standard compliant ICS. This will be through supporting producers and distributors of both charcoal and firewood ICS to improve their production infrastructure, benefitting from tailor-made BDS, accessing stove testing services to comply with the UNBS National Stove Standard, and up-scale their sales in underserved regions. EnDev will continue to support and advise MEMD, UNACC, UNHCR, UNBS and others to improve framework conditions for ICS market development through policy formulation, advocacy, sector support and implementation of standards.

### **Economic Development**

Economic Development envisioned and supported by EnDev will be contributing to energy access being the vehicle for income generation and employment, with a special focus on women as increased use of ICS in the PU sector benefits women to a large degree. Therefore, EnDev will increase its PU support for ICS companies by promoting their reaching out to mostly women and youth led entrepreneurs of restaurants, canteens, small hotels and other food vending businesses. This will result in increased sales of and more employment opportunities in ICS companies as well as improved income generation opportunities for productive users. The PU market is still largely untapped and underdeveloped, even more so in refugee and host communities.

### **Social Development**

EnDev will utilize findings from the Country Gender Analysis to improve gender responsive planning and implementation to improve health and welfare, dignity, protection, and time saving of the beneficiaries, to integrate more women and youth in production and distribution activities, as well as to empower female entrepreneurs in ICS companies by strengthening

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<sup>78</sup> Government of Uganda

their capabilities and skills. Additional specific key interventions will be agreed upon when developing the gender action plan.

### **Poverty Alleviation**

Despite the market-orientation of its activities, EnDev Uganda has a strong focus on LNOB, using its approaches to reduce burdens of marginalized households, including refugees. Access to improved cooking will relate to positive impacts on time and health in relation to firewood collection and cooking, as well as savings and environmental benefits. The support to increase sales of ICS companies will create income and employment. EnDev will incentivise companies focus especially on women and youth. Also, the sales of ICS will contribute to reducing tensions between refugee and hosting communities over the depletion of natural resources. Finally, cash or voucher for work or training approaches will be explored to support the demand for improved cooking within the refugee context.

## **1.18.4 Collaboration**

### **Solar Component**

#### **Sector alignment**

EnDev Uganda is making use of already existing partnership and review processes to ensure activities are well aligned with new developments in the sector. These include the scale-up of mini-grid activities as well as the overall discussion between electrification targets to be reached through grid, mini-grid or standalone off-grid products as seen through the finalization of the National Electrification and Off-grid Strategies, both of which are linked to the newly revised Energy Policy, where access to electricity in rural areas as well as for economic transformation are prioritized. Through EnDev's integration in the GIZ PREEEP (future CEAP) programme cluster, which is attached to and hosted by the MEMD, regular alignment, information exchange and input into planning and policy documents happens. EnDev Uganda's activities contribute actively to the GoUs NDC targets - increased access to reliable and sustainable energy for the 85% of Uganda's rural population, integrating energy solutions for off-grid schools and overall promoting uptake of solar systems. In addition, EnDev Uganda is in regular close coordination with USEA to ensure private sector voices are adequately represented in policy processes as well as critical sector developments including the development of a new Quality Assurance Framework for component-based systems or increasing interest in (self)-regulation for the PAYG business model. GoU also aims to support coordination of humanitarian and development actors' interventions to improve living conditions and strengthen self-reliance of refugees. This is backed-up by the Global Compact on Refugees (GCR) and its Comprehensive Refugee Response Framework (CRRF), Uganda's refugee legislation, the newly developed National Plan of Action ('National Action Plan to implement the GCR and its CRRF'), National Development Plan (NDP) III and district development plans of refugee hosting districts. EnDev contributes actively to align interventions in the HDP energy sector, thereby promoting improved framework conditions for the implementation of market-based approaches within the displacement context.

#### **Implementer base**

A number of other actors and programmes in the sector play a crucial role in addressing the different needs identified in the ToC. EnDev Uganda is already starting to or planning to implement joint activities with PSFU<sup>79</sup>, USEA and the Collaborative Labelling and Appliance Standards Program (CLASP) and has successfully launched the USAID & SDC co-funded Last-mile RBF for higher tier household access. Furthermore, EnDev Uganda will start to work closer with BoU, credit reference bureaus and USEA on the newly established Off-grid Energy Finance pilot, conceptualized together with GIZ Financial Sector Development Program. EnDev Uganda will work even closer with the Kenyan and Ethiopian EnDev country teams on a new regional project funded by the IKEA Foundation aimed at providing energy access to smallholder farmers. EnDev Uganda will support the World Bank led implementation of the PAYG toolkit. Finally, there will be cooperation with EnDev Kenya supporting newly starting private sector-led energy projects under the SCCIF.

EnDev collaborates with Private Sector Foundation of Uganda (PSFU) and MEMD to implement a COVID-19 Economic Relief Fund through a grant partnership aimed at supporting the solar and clean cooking sector to maintain levels of energy access reached prior to the pandemic, support them to survive the crisis and build resilience to future uncertainties arising from COVID-19 related restrictions.

Further notable development projects include the Uganda Energy Credit Capitalization Company (UECCC) which provides affordable capital to solar companies (working capital facility) and end users (solar loans via commercial banks). EnDev Uganda's solar partners have already commenced to tap into this opportunity and the project will further exploit these synergies. In addition, the Uganda Off-grid Market Accelerator (UOMA, funded by FCDO, Shell Foundation and USAID) has published research papers and market insights for the development of the OGS sector. UOMA is also implementing PU business pilots, provides value chain mapping, creates awareness about PUE and strives to strengthen investment readiness of solar companies and financial institutions. UNCDF, in collaboration with the Embassy of Sweden, is supporting 8 solar companies with a focus on PUE and SI electrification through its Renewable Energy Challenge Fund targeting farmers, shop vendors and schools with advanced energy solutions bundled with affordable financing. UNCDF also provides technical assistance to solar companies on investment readiness and financial reporting. All three partners – USAID, UOMA and UNCDF will be closely consulted in the development of the USEA PUE competence cluster to ensure its central role as resource centre for interested companies. As OGS PUE depends on availability of and knowledge about energy-efficient appliances, EnDev Uganda seeks to engage CLASP for capacity building through the competence cluster. Other upcoming programmes have the potential to significantly upscale existing efforts, key among them the World Bank Uganda Electricity Access Scale-up Project (EASP) as well as the Beyond the Grid Fund Africa. The EASP comes with a significant amount of funds to support, besides others, OGS companies and customers through loans, grants, RBF, training and similar, thereby potentially offering a broad range of fields for collaboration. As an experienced player in the sector, EnDev is supporting preparation activities as far as possible. With regards to displacement settings, EnDev is carefully cooperating with stakeholder of the humanitarian, development, peace (HDP) nexus, like UNHCR, relevant government entities, NGOs and private sector stakeholders.

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<sup>79</sup> Private Sector Foundation Uganda

On national level, development partners are coordinated in the respective Development Partner Group. EnDev is represented by the GIZ PREEEP cluster coordinator.

### **Leverage/Spin-off**

In the OGS sector, EnDev Uganda has been at the forefront of facilitating market development for the household target group and among the key actors that pilot new approaches for energy access for social institutions, productive users as well as refugee and hosting communities. Other development partners such as USAID and UNCDF have followed and scaled-up similar approaches with larger funds while in the refugee context energy kiosks have received a lot of attention and are being copied by NGOs. EnDev Uganda intends to equally replicate this success through piloting more innovative RBF approaches including more hard-to-reach target groups (i.e. MSMEs, schools, refugee settings) as well as customized incentive calculations and PAYG default insurance approaches all of which have already gathered significant interest and have high scale-up potentials. Significant upscaling potential is expected especially for the Last-mile RBF implemented by EnDev Uganda and co-funded by USAID & SDC which targets to facilitate the sale of 10,000 SHS, largely Tier 2, to last-mile households. EnDev Uganda is currently starting to implement activities with significant financial leverage potential. Through targeted business development support as well as the piloting of an integrated credit reference system accessible to PAYG providers companies will be capacitated to access bigger private & public funding at reduced rates. Additional activities are also expected to be leveraged out of the PUE competence cluster, which has the potential to inform numerous companies and sector stakeholders. Through funding by the IKEA Foundation, EnDev Uganda is also joining the regional effort to develop & pilot sustainable business models providing PUE solutions to smallholder farmers, a project with strong scale-up & follow-up funding potential. World Bank is interested in a closer exchange with EnDev in order to potentially benefit from EnDev's learnings and scale successful approaches for Ugandans and refugees through the EASP. Lastly, EnDev Uganda will support pilot projects initially focusing on access to electricity in refugee settlements through the SCCIF.

### **Nexus**

EnDev Uganda is aiming to build a stronger coordination with key stakeholders in the agricultural sector as part of the regional project supporting energy access for smallholder farmers funded by the IKEA Foundation. For this same NEXUS, EnDev has been invited to be part of the Steering Committee of an envisaged new coordination mechanism set-up by Power For All. In the refugee context, EnDev will closely collaborate with HDP actors in the jobs and livelihoods, the health and the education in emergency sectors. A pilot is envisaged to be implemented with a key partners including private sector and a partner specialised in gender transformative action to bring together gender and energy.

## **Cooking Energy**

### **Sector alignment**

Activities are aligned with MEMD and its relevant sector and GoU policies, strategies, and targets with the NDP III (2020-21 – 2024-25) aiming at reducing the share of biomass energy used for cooking from 88% in FY2018/19 to 50% and increasing the share of clean energy used for cooking from 15% in FY2018/19 to 50%. Major policies such as the Energy Policy, Sector Development Plan II, Biomass Energy Strategy are currently undergoing a revision.

Together with the bilateral GIZ Energy programme PREEEP (future CEAP), EnDev Uganda works closely with MEMD and will contribute to the updating of these policies and strategies ensuring that improved cooking, market development, LNOB, enabling environment and refugee matters are well reflected. EnDev will provide input to strengthen advocacy and sector coordination. With the recent passing of the Stove Standard by UNBS, the certification process is currently voluntary as the government and key stakeholders work towards increasing awareness around the standard by stove MSMEs and the public, as well as streamline and support compliance under the National Action Plan for implementation. EnDev will continue to support this process in collaboration with MEMD and UNACC through our engagement with private sector on efficient production infrastructure, as well as stove testing and BDS support. EnDev will continue to provide strategic sector support, e.g. to UNACC through support to restructuring and organisational development in collaboration with GIZ Civil Society Support Programme (CUSP). MEMD is also exploring potential and feasibility of alternative fuels and higher tier technologies including e-cooking, and EnDev continues to actively and strategically engage in the topic and implement a market analysis. EnDev will collaborate with MEMD and CEAP-PREEEP to identify alternative fuel business case options. With increasing scrutiny on high biomass fuel consumers, as well as PuE and higher tier cooking energy access, EnDev plans to continue to collaborate with key stakeholders on enhancing market intelligence and PuE ICS access.

### **Implementer base**

EnDev is one of the key players in the clean cooking sector with vast experience in facilitating access to improved cooking technologies through private sector engagement, close collaboration with MEMD, as well as a knowledge resource for various stakeholders looking to enter/expand/invest in the sector. EnDev also played a crucial role in the founding of the sector association UNACC and continues to support the strengthening of its Secretariat to improve its self-reliance and boost sector coordination and advocacy efforts, in collaboration with GIZ CUSP.

The Uganda Energy Credit Capitalization Company (UECCC) also provides affordable capital to stove companies (working capital facility) and UNACC plans to sensitize its members on how to access such funding streams, including with other commercial banks in Uganda e.g. Stanbic Bank, who offer SME financial literacy and other relevant financial products. EnDev collaborates with Private Sector Foundation of Uganda (PSFU) and MEMD to implement a COVID-19 Economic Relief Fund through a grant partnership aimed at supporting the solar and clean cooking sector to maintain levels of energy access reached prior to the pandemic, support them to survive the crisis and build resilience to future uncertainties arising from COVID-19 related restrictions. EnDev foresees to collaborate with the World Bank and CLASP on market studies and activations, sharing of best practices and innovation in distribution models and suitable ICS technologies for PuE and higher tier access together with UNDP Accelerator Lab initiative and other relevant stakeholders. UNDP's Accelerator lab uses tools and methodologies to unlock market knowledge to make it explicitly available for development partners to make their approaches more relevant. World Wildlife Fund (WWF) and EnDev Uganda are key supporters of UNACC.

For the development of market structures in refugee settings, and aligned with the CRRF, EnDev collaborates closely with UNHCR and members of WorkGrEEEn7 to dialogue and agree on coordination and cohesion of humanitarian and development approaches.

Especially the harmonization and alignment of in-kind distribution of energy efficient stoves vs. their marketing and sales by private sector stakeholders will be a precondition for success and is part of the joint deliberations.

### **Leverage**

In Uganda, there are few stakeholders in the clean cooking sector with significant experience with market-based approaches for energy access. Main implementers like World Bank ESMAP and CLASP have gained valuable experience that EnDev plans to leverage with the aim to increase the market penetration and distribution outreach of higher tier and PuE ICS. The World Bank Modern Energy Cooking Services (MECS) initiative – through the Centre for Research in Energy and Energy Conservation (CREEC), and UNDP Accelerator Lab are conducting key market studies on e-cooking and high biomass consumers (including HHs, SMEs, SIs) respectively, and EnDev plans to continue to share its experience and learnings with them and other stakeholders, to work towards the sustainable development of the sector and identify viable business models/providers for further upscaling if additional funds are available. These could offer opportunities for further collaboration to grow the energy access sector. Lessons learnt from implementing ICS RBFs in refugee settings, will be documented and not only shared with WorkGrEEen but other critical sector working groups such as jobs and livelihoods, protection and SGBV.

World Bank, through its new EASP, has mentioned interest in exchanging about lessons learnt and successful approaches, that have a potential to be scaled-up by World Bank. This is both, generally with regards to cooking energy, but also with a focus on refugees and hosting communities.

### **Nexuses**

**Civil Society Nexus:** EnDev will continue to collaborate with GIZ CUSP to support UNACC and the sector as a whole to build solid institutional structures aiming at a better representation and increased level of coordination of the ICS companies. CUSP already supported EnDev to train UNACC Executives on key governance and administrative processes in 2020 and the outcomes are to be built on by the new Secretariat. If additional funding is availed beyond 2022, these activities could be upscaled to expand UNACC support to the private sector. **Local Economic & Development/Humanitarian Nexus:** Market-based approaches in refugee settings, like energy kiosks, will be further linked to activities in the areas of MSME promotion, cash for work and other cash-based initiatives together with e.g. WFP, Give Directly and others.

## **1.18.5 Modalities**

### **Solar Component**

#### **Approach**

EnDev will use the RBF as its main approach to incentivize private sector actors to intensify efforts to reach previously neglected target groups, namely household customers in last-mile areas and refugee settings, schools as well as MSMEs the latter including within the refugee context. These performance-based partnerships are designed specifically to improve product offers, after-sales services, end-user finance options as well as distribution and awareness

outreach. Qualifying companies receive incentive payments for each verified sale in the respective categories (target group & product range) aimed at de-risking initial investment to understand & reach neglected target groups. EnDev Uganda is providing accommodating support detailed below to both the private sector as well as the enabling environment to overcome the most pressing barriers to growth and scale in the sector. Other approaches such as establishment of energy kiosks and energy hubs as well as electrification of health centres with support to income generation for Operation and Maintenance will be implemented in refugee settlements and host communities in order to leave no-one behind. This main private sector focussed market-building approach is embedded into a broader and higher-level advisory service in order to contribute to a conducive environment.

### **Activities:**

- Incentivize solar companies to expand their operations and efforts in reaching neglected targets groups that lack reliable energy access (off-grid or unreliable grid):
  - Refugee RBFs (households and PUE, through Pico PV & SHS) and awareness campaign
  - PUE RBF aimed at Tier 1 & Tier 2 solar systems (SHS + appliance), aligned with EnDev PUE definition
  - Schools RBF aimed at Tier 1 & Tier 2 SHS (60% of which are primary schools)
  - Last-mile RBF (co-financed by USAID, SDC)
- Establish proof of concept for new and innovative aspects of the classic Uganda RBF approach for example by including differentiated incentive payments, remoteness calculation based on GPS data, default insurance mechanism for PAYG customers, PUE end-user training requirements or combining pre- and post-payments to minimize financial risks as well as specific incentive schemes for companies to engage in refugee settlements and host communities in line with GoU priorities to actively engage with private sector in the refugee response.
- Support to the enabling environment through concerted input together with GIZ PREEEP Energy Cluster (future CEAP) into the review of key policies and strategies, as well as supporting other sector actors as they start rolling out more quality standards
- Establish sustainable & scale-up business cases for PUE for smallholders as well as knowledge exchange as part of the regional project funded by the IKEA Foundation
- Support OGS companies with BDS including training, coaching and mentoring based on priorities identified from a needs assessment with the aim to improve investment readiness, business structures and resilience to sustainably grow also in light of the COVID-19 related restrictions
- Packages for which first activities are planned in 2021, but further engagement is still awaiting financing from EnDev and other sources:
  - Facilitate a pilot linking solar energy companies to the credit reference system together with the GIZ Sector Project on Financial System Development in order to improve sustainability of the PAYG business model and allow previously unbanked solar customers to benefit from their own credit histories
  - Capacitate promising solar companies (both larger international companies as well as smaller, local players) with targeted business development services to overcome their operational & strategic challenges in order to improve the sustainability of business cases as well as investment readiness needed to scale-up operations



- Set up a productive use competence cluster at USEA providing training, market insights, networking opportunities (including with other sectors), sourcing/supply chain linkages and support to scale-up market development
- Support core activities at USEA including awareness raising and self-regulating activities in the solar sector including customer protection & quality standard enforcement

### **Reasons for Approach**

As described earlier, a range of actors have been crucial in pushing the solar sector especially for urban or semi-urban areas. EnDev Uganda's RBF approach was an important contributor to reach goals in access to pico-pv products as it enabled companies to develop their own strategies, sustainable business models and achieved co-investment by the company side. Building on its initial success a more targeted RBF approach was chosen to de-risk private sector investment for neglected target groups while at the same time supporting the establishment of proof of concept for market-based approaches in these areas. Companies have the flexibility to apply for one or multiple RBFs in order to both support small, local companies as well as larger, international companies depending on their capacity. The design is based on existing pilots (schools, refugees), market research (PUE) as well as detailed scoping (Last-mile RBF) determining existing barriers, customer's interest & ability to pay and relevance for the overall market development. Supporting activities were chosen in close collaboration with all relevant partners for their potential in overcoming systemic challenges in the sector that impede sustainable scale-up of business cases. EnDev Uganda is taking up the role of facilitator and enabler, thereby ensuring a maximum level of ownership of local partners. Learnings, especially in addressing energy needs for marginalized customers, e.g. very remote households or refugee households, will be systematically gathered in order to inform GoU and other stakeholders about potential needs to adjust approaches.

### **Effectiveness and cost-efficiency**

Previous external verification results indicate that overall RBF companies follow the directive given, adhere to quality standards and after-sale service agreements and reach many of the targets set. In addition, our follow-up showed that the RBF approach, if combined with additional support to the company as well as the supporting environment, not only is effective in reaching its direct energy access targets but are also effective in reaching indirect effects as companies use the gained experience and skills to access other funding opportunities. Finally, the EnDev Uganda RBF approaches are planned to maximize cost-efficiency by providing differentiated incentives and making payment contingent on excellent verification results thereby minimizing spoilage.

## **Cooking Energy**

### **Approach**

On the supply side, EnDev will provide flexible and market responsive financing to ICS companies to enhance their distribution outreach and their production infrastructure through the use of performance-based partnerships, which focus on effectiveness and cost efficiency by providing support linked to verifiable results. ICS companies will receive incentive payments that can be used to close funding gaps in their production, sales or marketing operations to considerably and sustainably upscale business operations through creation of lasting production and distribution structures and the activation of markets.

These performance-based partnerships are designed specifically to improve product offers, after-sales services, end-user finance options as well as distribution and awareness outreach, also in refugee hosting areas. In addition, to ensure that stove MSMEs can not only grow but thrive despite the given COVID-19 impacts, EnDev will support them to improve business operations and structures, increase investment readiness as well as build resilience for future sustained growth, following an in-depth Business Development Services (BDS) Needs assessment. The companies to be supported with BDS will be selected across distinct categories of very small, medium and more semi-industrial ICS capacities in the central region of Uganda, with a potential smaller pilot with a manufacturer/distributor of higher tier stoves e.g. e-cookers. The targeted interventions and improvements will be achieved through training, coaching and mentoring to have more impact on the SMEs. This approach will be complemented by specific gender actions that ensure equality, mainstreaming and transformation.

To ensure a favourable enabling environment, EnDev will closely cooperate with MEMD on relevant sector policies, as well as improving the sector association landscape to improve effectiveness of policy advocacy, resource mobilization efforts, better service delivery to private sector members to ensure more sustained growth in the sector, with better knowledge management for potential investment and strategic partnerships in the sector.

### **Activities**

- Supporting ICS companies in upscaling of distribution outreach to HHs and food vending businesses, including in refugee communities, through RBF frameworks where performance incentives are used by the ICS companies to establish and improve distribution structures, fill key marketing and sales gaps with trained personnel, strengthen vendor networks for wider ICS market penetration coupled with market activations and awareness activities (no full funding of activities offered)
- Support the improvement of production infrastructure of ICS companies to increase production capacity, efficiency and consistent quality through conducting production infrastructure assessments and integration of relevant efficient production technologies to increase compliance to the UNBS National Cookstove standard. Provide stove testing support for the implementation of stove standards.
- Support ICS companies with BDS including training, coaching and mentoring based on priorities identified from a needs assessment with the aim to improve investment readiness, business structures and resilience to sustainably grow also in light of the COVID-19 related restrictions
- Implement awareness raising activities on the benefits of ICS and healthy cooking practices for HH and food vending businesses through campaigns and other forums including highlighting best cooking practices, benefits of ICS, cookstove demonstrations, community engagement, market activations aiming to generate additional demand for ICS, and link vendors to ICS SMEs. All RBF partners also incorporate their own awareness and marketing under EnDev partnerships. Therefore, EnDev Uganda embraces both levels of awareness: the general awareness level as well as preparing the grounds for a purchase decision.
- Supporting higher tier cooking access through identifying a suitable pilot approach for e.g. e-cooking in collaboration with relevant stakeholders such as CLASP, UNDP, MEMD, etc. This could include willingness to pay study, Kitchen Performance Tests with

sample HHs, or integration of digital sales tools/platforms for using innovation to penetrate new/existing markets. EnDev has already been engaged with Burn Manufacturing, Bidha Sassa, Africa Clean Energy, and PESITHO, on the above areas, and will build on findings from the on-going joint PREEEP / EnDev alternative fuel study, and other market analysis being done

- Support UNACC's internal governance structures to better enable them to operationalize the strategic plan, mobilize additional resources to enhance sustainability and reduce donor dependence, ably advocate and represent member needs and interests
- Support an enabling environment through concerted input into the review of key policies and strategies together with GIZ PREEEP energy cluster (future CEAP)
- For refugee settings the same energy kiosk and energy hubs approaches apply as described in the solar component. The kiosks will also sell stoves and advise customers with regards to quality and benefits or different stove models.

### **Reasons for Approach**

EnDev Uganda has maintained a significant proportion of the Uganda market penetration in terms of number of people reached with ICS through our strategic partnerships with private sector stove companies. This has led to much-improved market coverage through the private sector, even in more remote locations, e.g. West Nile region (ICS producer – International Lifeline Fund, ILF) and Western and Eastern Uganda (ICS distributor – UpEnergy). However, more efforts will be made to scale up more enterprises in the clean cooking private sector to continue to sustainably grow the market and meet the ever-increasing demand for cooking energy, as well as increase the number of stove MSMEs complying with the National Stove Standard. EnDev Uganda's experience with performance-based partnerships for ICS distribution have shown immense up-scale potential, and that private sector actors can benefit by being enabled to operate and grow in a self-sustaining manner, receive market responsive financing, collaborate with other companies in consortia, to expand market penetration to new areas as well as to create more employment. The approach provides companies with the necessary implementation flexibility to adapt to changes in market and business trends, while also investing their own resources into implementation. In the medium term, EnDev's support expected to increase solidity of the companies, that qualifies them to develop bankable proposals or obtain support from organisations that offer larger financial ticket sizes. Structural changes in framework conditions on the other side can only be supported through close collaboration with MEMD, UNACC, UNBS and UNHCR.

### **Effectiveness and Cost-efficiency**

External verification results of the achievements of especially the semi-industrial stove producers and larger distributors demonstrate the effectiveness of the RBF approach. The grand majority of sales adheres to the minimum quality standards, requirements for customer training and after-sales services while reaching the defined targets. As the RBF schemes are tailored according to targets and only paid out upon achievement of these, cost-efficiency is enhanced. Specific RBF incentives are developed for refugee hosting areas in order to LNOB. The effectiveness with regards to gender impacts will be improved through future activities that improve mainstreaming and introduce measures for gender transformation.

## 1.18.6 Results

Project results	Targets	[Other target dimensions/indicators]
People: Access to Electricity	113,053 <sup>80</sup> / 32,033 <sup>81</sup>	29,947 through SHS, 2,086 through Pico PV both in refugee settings (see <i>EnDev logframe Indicator 1</i> ) (disaggregated by female and male headed households)  X people ( <i>exact number tbd</i> ) empowered to make investment decisions for needs-based, climate-friendly energy supply through awareness activities ( <i>Ind. 1.1</i> ) (disaggregated by gender)
People: Access to Cooking	1,259,183 <sup>80</sup> / 448,007 <sup>81</sup>	ICS (charcoal and firewood, including small pilot with higher tier) ( <i>Ind. 1</i> )  X people ( <i>tbd</i> ) empowered to make investment decisions for needs-based, climate-friendly energy supply through awareness activities ( <i>Ind. 1.1</i> ) (disaggregated by gender)
SI: Access to Electricity	1,307 <sup>80</sup> / 547 <sup>81</sup>	542 Tier 1 & 2 systems for primary (60%) and secondary schools and 5 Tier 3 systems for Energy Kiosks/Hubs and Health Centers ( <i>Ind. 2</i> )  X pupils ( <i>tbd</i> ) have access to improved educational facilities through electricity ( <i>Ind. 1.1</i> ) (disaggregated by gender and age)  30 youth entrepreneurs have additional employment in refugee settings ( <i>Ind. 4</i> ) (disaggregated by gender, age and status)  50,000 refugees and host community members have access to improved modern health services ( <i>Ind. 1</i> )
SI: Access to Cooking	-	
PU: Access to Electricity	1,782 <sup>80</sup> / 787 <sup>81</sup>	705 Tier 1-3 systems including appliances for MSMEs (30% female run), 82 Tier 1 systems targeting female entrepreneurs in refugee settings ( <i>Ind. 3</i> )  X% of average income increase through PUE appliance usage at MSME level
PU: Access to Cooking	548 <sup>80</sup> / 548 <sup>81</sup>	548 ICS for PUE entities (food vending businesses) ( <i>Ind. 3</i> )  X female led PUE entities ( <i>tbd</i> ) have access to improved cooking technologies (disaggregated by gender)

**Additional expected results in the solar component** include strengthened capacity and business planning at six locally operating off-grid solar companies through business development support which will allow companies to scale-up, achieve higher sales and access private capital. In addition, the Off-grid Energy Finance pilot linking OGS companies to the credit reference system will improve credit management & bankability at company level, provide critical learning moments for PAYG sector development as well as a potential pathway to financial inclusion for PAYG customers. Finally, outcomes of the sector support including the PUE competence cluster will boost market knowledge, spark interest in the PUE target group and create valuable points for exchange. The PUE [Target Entry Tool](#) provides more details on the type of MSMEs being targeted.

**In the cooking sector, additional expected results** include strengthened capacity and business planning at six locally operating stove companies through business development support which will allow companies to scale-up, achieve higher sales and access private

<sup>80</sup> Adjusted absolute targets (2010 – 2024)

<sup>81</sup> Adjusted additional targets (2020 – 2024)

capital. Ten additional local stove producers will also be supported to improve production efficiency and compliance with the UNBS national stove standard through production infrastructure support. In addition, the sector support activities including support to UNACC, as well as the awareness activities will aim to increase market intelligence and knowledge management regarding PuE for best practices on expanding this segment, in addition to penetration and adoption of ICS for PuE entities.

**In both sectors**, the support to MEMD and other policy level entities will improve the enabling environment for OGS and ICS market development, awareness and sector support. The expected improved alignment of approaches of government, humanitarian and development stakeholders in displacement settings will contribute to more sustainable impacts and increased self-reliance of refugees and nationals. Awareness campaigns on the benefits of ICS and quality solar products will reach a grand part of the Ugandan society and increase demand for these products.

## 1.18.7 Sustainability

### Solar Sector

#### Financial sustainability

Through EnDev Uganda's activities, partners only receive incentives aimed at addressing critical funding gaps to enable business to scale-up activities, no full activity funding is provided. Therefore, all partners need to invest significantly on their own nurturing strong ownership for the success of their business activities. In addition, partnerships are never meant to be permanent but serve as limited support packages to mitigate certain challenges faced by the private sector to enable self-sustaining growth without the need for continued injection of funds. In the refugee context, EnDev Uganda's contributions are higher in comparison, while still aiming at existing funding gaps. They include financing of construction measures, start-up investments and de-risking for kick-starting entrepreneurs. End-customer prices will not be subsidized unless inevitable or for awareness and demand creation e.g. among the extremely vulnerable individuals within the refugee and host community population. Having received in-kind, training and mentoring support, businesses are expected to run in a financially sustainable manner. Furthermore, EnDev Uganda will seek to leverage further co-financing for its activities such as the electrification for social institutions in refugee settings to be replicated by others and with contributions from humanitarian donors and/or development partners.

#### Institutional sustainability

EnDev Uganda's support has been crucial in increasing the number of quality solar distributors and their reach in the household segment especially in semi-urban and urban settings. This, together with capacity development measures by other partners has been critical in establishing USEA as a leading voice representing the solar private sector towards both government as well as donors. Through the planned joint development of the PUE competence cluster, EnDev Uganda will strengthen the enabling environment even further by adding support for businesses moving into the PUE segment. This will also enable USEA and EnDev to make contributions to policies and strategies of GoU regarding PUE for a more conducive regulatory environment. In the refugee context, EnDev Uganda participates in the

WorkGrEEN for sector coordination and peer learning between humanitarian and development actors, and give advice to the future MEMD-led Secretariat for the Implementation of the up-coming Sustainable Energy Response Plan for Refugees and Host Communities. With regards to health centers' electrification, UNHCR will continue to support GoU to run and keep up these health centers and even further invest in these for instance in medical appliances for improved health outcomes.

### **Ecological sustainability**

EnDev Uganda only works with partners compliant with Ugandan environmental laws. Due to the growth of the OGS sector in the recent years, the recovery, safe disposal or recycling of hazardous solar components such as solar batteries has become a pertinent issue which is still neglected both by GoU and most solar distributors. EnDev Uganda will continue to promote partners that have started approaches for the safe disposal of defunct solar components such as batteries through its tender processes. A further collaboration is planned with CLASP on supporting first pilots in Uganda leading out of the Global LEAP award on E-waste. In addition, EnDev Uganda will continue to contribute to the debate on improving self-regulation and governmental regulations through various policy & stakeholder processes. Through increased adoption of off-grid PV, the project will also contribute to reduce the usage of fuel generators and their negative environmental impacts. The introduction of longer-lasting batteries for solar systems will reduce the amount of e-waste, while the promotion of quality entry level solar products will reduce battery-related waste in refugee settlements. An e-waste pilot will be implemented by PREEEP ESDS in the same settlement where EnDev will electrify health centers and already has established an energy kiosk. Thus, future waste has some potential to be collected appropriately and even be recycled eventually.

### **Technological sustainability**

EnDev Uganda carefully assesses solar solutions for their aptitude in the local context, before it decides to support a roll-out, this concerns key aspects such as affordability, user-friendliness, robustness, long term availability and possibility for local maintenance and repair. Only product solutions that excel in these categories are considered. For this purpose, EnDev Uganda will engage with strategic partners such as CLASP as well as local partners including CREEC, UNBS and the Ugandan Industrial Research Institute (UIRI). Specific efforts are undertaken to support the establishment of sustainable income generating activities for solarized health centers that will improve O+M implementation.

### **Social sustainability**

By supporting solar distributors to reach various MSMEs including smallholder farmers and social institutions across Uganda with suitable solar solutions these will be enabled to use modern energy access for improving and upscaling their businesses and service delivery, for example in the fields of education, retail service provision, commercial farming and others. This will create more employment opportunities within the benefitting MSMEs and SIs as well as within the growing solar distributors. The project will be committed to ensure that women and youth are benefitting extensively from these activities. The EnDev Uganda gender action plan will come up with specific actions that will achieve increased gender equality. EnDev Uganda thus contributes to the socio-economic transformation of rural regions off the grid as envisaged by GoU.



## Cooking Sector

### **Financial sustainability**

Through EnDev Uganda's activities, partners only receive incentives aimed at addressing critical funding gaps to enable business to scale-up activities, no full activity funding is provided. Therefore, all partners need to invest significantly on their own nurturing strong ownership for the success of their business activities. In addition, partnerships are never meant to be permanent but serve as limited support packages to mitigate certain challenges faced by the private sector to enable self-sustaining growth without the need for continued injection of funds. Support received through EnDev will enable ICS companies to get more financially sustainable. For example, through the planned BDS support to Stove MSMEs companies might become eligible for funding and investment e.g. from GET.invest, the upcoming World Bank EASP or loan financing. In the refugee context, EnDev Uganda's approach is similar to the one describes in the solar component's description on financial sustainability.

### **Institutional sustainability**

Through EnDev Uganda's support, the ICS sector has seen a significant growth of especially of semi-industrial ICS companies. These and additional companies will benefit from the envisaged BDS support, thereby receiving the opportunity to further grow and improve the solidity of their company operations in general. Complementary to the private sector support, EnDev Uganda will, in coordination with MEMD, UNACC, UNHCR and other development partners, continue to support sector advocacy and coordination. Strategic input to key policies and strategies will foster an enabling environment for the stakeholders to thrive. The support to UNACC in terms of organisational development will provide UNACC with the necessary basis for institutional sustainability.

### **Ecological sustainability**

EnDev Uganda only works with such partners that comply with Ugandan environmental laws. The project continues to promote ICS which meet EnDev's minimum performance requirements, as well as the UNBS National Biomass Cookstove standard, to ensure that HH are provided with clean and efficient technologies. These ICS will replace inefficient stoves and thus reduce global black carbon emissions and make a direct contribution to an improved environment. In addition, EnDev in coordination with MEMD, UNBS, CREEC and UNACC will support the implementation of the national stove standard to increase the number of SMEs meeting the certification criteria.

### **Technological sustainability**

EnDev Uganda assesses ICS for their aptitude in the local context, before deciding to support the respective companies. This includes ensuring that reliable data on key aspects of the ICS such as performance, usability, durability with results from independent and certified testing institutions is available. This also concerns aspects such as long-term availability and provision of localized maintenance and repair with clear after-sales and warranty services offered by the stove MSME partners EnDev works with, including in refugee settings where technology adoption has to be tested and services have to be built from scratch. Only cooking solutions that excel in these categories will be included in distribution upscaling activities. EnDev will also continue to support innovative designs, as well as explore opportunities, feasibility and upscale potential of distribution approaches for ICS companies to diversify the



sector e.g., with higher tier ICS access through on-going engagements with manufacturers and distributors such as Burn Manufacturing (exploring a willingness-to-pay assessment in central Uganda), Bidha Sassa (piloting distribution of higher tier ICS through sales to village savings groups in Western Uganda), Africa Clean Energy and PESITHO (piloting higher tier sales in refugee and host community settings). The collaborations with CLASP, CREEC, and UNDPs Accelerator Lab on PuE ICS will inform EnDev's approach in the higher tier ICS segment with selected partners. If allocated funding allows, EnDev plans to upscale and/or pilot respective activities during the project phase.

### **Social sustainability**

By supporting manufacturers and distributors to expand and strengthen their ICS sales distribution and infrastructure as self-sustaining businesses through BDS, EnDev Uganda contributes to the socio-economic transformation of rural regions through increased household and productive use access to cleaner cooking solutions, and empowering youth and women through micro-entrepreneurship, sales agent and vendor training programmes offered by the stove companies. There is significant potential for promoting gender equality through increasing access to renewable energy, more efficient and time-saving technologies, and improved biomass sources. Most important aspects are: Positive health impacts through increased uptake of ICS and reducing the time women and girls spend on domestic chores such a time-consuming firewood collection and thus freeing them for other social and productive activities, including education, study and income-generation activities. In addition, EnDev continues to have a high focus on end user training and after sales services in the stove RBFs to further bolster behavioural change, which have shown to foster more sustained adoption, increase referral sales to new users, reduce stove stacking instances since most ICS users fully transitioned from previous traditional cooking methods, and over 90% were willing to buy replacements after the stove lifetime, as per the independent RBF audit. The EnDev Cooking Energy Awareness Campaign has rendered positive results in the sense, that most interviewees have understood the messages, changed behaviour and roundabout 40% have purchased ICS after hearing / seeing the messages.

There is also going to be reduced SGBV risks for women and girls collecting firewood, especially for female refugees. It will also positively affect social cohesion between refugees and host communities as there will be less conflicts over natural resources in and around densely populated refugee settlements. In addition, as many of the food vending businesses are run by women, the PuE ICS will also offer significant opportunities for increased income generation, growth of their businesses, fuel savings and resilience especially in the on-going pandemic and related restrictions where women have lost more employment relative to men. The same is true for women who as members of the management team of businesses like energy kiosks will increase their income and be empowered.

## **1.18.8 Gender Strategy and Safeguards**

### **Gender strategy**

EnDev Uganda's **gender analysis** carried out in 2020 has highlighted that Uganda is classified as having high discrimination against women, with high levels of gender discrimination in relation to access to productive and financial institutions, and discrimination in the family as per the Social Institution and Gender Index (SIGI) of 2019 measuring social norms and

values that are behind gender inequalities. Besides the huge gaps in gender equality, there is nonetheless an enabling context for gender responsive and gender transformative measures in the energy sector. EnDev Uganda gender strategy is aiming at contributing to economic empowerment of Ugandan and refugee women. The team will collaborate with ENERGIA to reflect on the Uganda EnDev Gender Analysis 2020 findings more deeply and develop a **Gender Action Plan (GAP)** that will subsequently be implemented with backstopping and mentoring support to the EnDev Uganda team by ENERGIA experts.

The following activities will be implemented and/or further planned for with actual targets:

- Collect disaggregated data by gender, age and status as applicable to inform project progress and planning.
- The Ugandan legal and policy framework promotes gender equality and provides an enabling context for gender responsive and gender transformative measures. The EnDev team will support GIZ PREEEP in their efforts with MEMD to develop a gender strategy for the sector and the ministry, close knowledge gaps, support the continuous development and adjustment of the framework, and enhance the capacity to implement it.
- Making use of promising opportunities to partner with actors in a vibrant women's movement in Uganda. Consider approaching such partners that are supporting VSLAs or comparable groups as they have been effective at increasing women's empowerment, savings and access to credit.
- The design of gender sensitive and gender transformative interventions will support women and youth-led businesses in need of PUE.
- Building capacity of private sector partners on gender can enable them to increase gender equality in their own business but can also include gender mainstreaming and gender transformative elements in their market development approaches, choice and capacity building of female and male sales agents, marketing officers and technicians.
- Incentivise private sector actors to actively approach women in their promotional activities in order to better address women's needs for energy access, their payment options and usage of energy technology.
- Traditionally, women and men have different roles in the agriculture or jobs and livelihoods sectors. Agricultural technologies may disproportionately assist women or men depending on their purpose and may parallelly lead to unintended negative consequences for the other gender. Business support needs to pre-empt potential benefits and risks related to each gender based on norms, traditional roles, access to land and assets, access to finance, decision-making powers among others. In refugee contexts, initiatives need to carefully balance inclusion of women and men to avoid exacerbating difficult dynamics as traditional roles are regularly altered. Lessons learnt on gender and energy will be shared with key stakeholders such as Office of the Prime Minister, district local governments, UNHCR and other HDP nexus actors.
- Awareness campaigns will be designed to reflect different ways of how women, girls, boys, and men in urban, rural and refugee areas effectively access information.

The consultant for the gender analysis has supported the **EnDev team's reflection on its own capacities on gender**. Initial findings show that EnDev staff are aware of the existence of GIZ gender policies, however, staff who worked for EnDev for less than a year had not had any introduction or training yet and majority expressed they feel they do not have the skills or knowledge or feel adequately supported in incorporating gender transformation approaches into project implementation. Activities will be developed to ensure capacity building

to internalize gender awareness as well as better implement gender mainstreaming and transformation within the planned activities.

### **iPCA**

An Integrated Peace and Conflict Analysis (iPCA) building upon existing iPCAs in the country will be performed for EnDev Uganda by a consultant contracted by EnDev Global. The iPCA will define the main factors of conflict, fragility and violence in the country affecting the project as well as mitigation measures, external risks and impacts.

## Annex 1 – PUE Target Entry Tool

Country	Access technology	Sector	Type of economic activity	Appliance	Company size	Share of employees	Led by women	Led by couple	Target # of connections
Uganda	Stoves	Accommodation and food service activities	Food and beverage service activities	cooking	1-4 employees	70% women	30%		<b>1083</b>
Uganda	Stoves	Accommodation and food service activities	Food and beverage service activities	cooking	5-9 employees	60% women	20%		<b>1084</b>
Uganda	SHS	Agriculture, forestry and fishing	Crop and animal production, hunting and related service activities	pumping	1-4 employees	50% women	30%		<b>120</b>
Uganda	SHS	Agriculture, forestry and fishing	Crop and animal production, hunting and related service activities	pumping	5-9 employees	50% women	30% women		<b>30</b>
Uganda	SHS	Wholesale and retail trade; repair of motor vehicles and motorcycles	Retail trade, except of motor vehicles and motorcycles	cooling	1-4 employees	50% women	30% women		<b>110</b>
Uganda	SHS	Wholesale and retail trade; repair of motor vehicles and motorcycles	Retail trade, except of motor vehicles and motorcycles	cooling	5-9 employees	50% women	30% women		<b>28</b>
Uganda	SHS	Arts, entertainment and recreation	Sports activities and amusement and recreation activities	Other	1-4 employees	50% women	30% women		<b>110</b>
Uganda	SHS	Arts, entertainment and recreation	Sports activities and amusement and recreation activities	Other	5-9 employees	50% women	30% women		<b>28</b>
Uganda	SHS	Information and communication	Information service activities	charging	1-4 employees	50% women	30% women		<b>110</b>
Uganda	SHS	Information and communication	Information service activities	Other	5-9 employees	50% women	30% women		<b>28</b>
Uganda	SHS	Other service activities	Other personal service activities	cutting	1-4 employees	50% women	30% women		<b>110</b>
Uganda	SHS	Other service activities	Other personal service activities	cutting	5-9 employees	50% women	30% women		<b>27</b>
Uganda	energy hub (extended kiosk)	Other service activities	Other personal service activities	cutting	1-4 employees	50% women			<b>2</b>
Uganda	energy hub (extended kiosk)	Arts, entertainment and recreation	Sports activities and amusement and recreation activities	other	1-4 employees	25 % women			<b>1</b>
Uganda	energy hub (extended kiosk)	Information and communication	Computer programming, consultancy and related activities	other	1-4 employees	50% women			<b>1</b>
Uganda	SHS	Agriculture, forestry and fishing	Crop and animal production, hunting and related service activities	other	1-4 employees	50% women	50% women		10-100

# Abbreviations

A2EI	Access to Energy Institute
ABC	Advanced Biomass Cookstoves
ABERME	Beninese Agency for Rural Electrification and Energy Efficiency
ABF	Ajummary Bikas Foundation
AC	Alternating Current,
ACAD	Association des communes de l'Atacora et de la Donga
ACCS	Advanced Clean Cooking Solutions Programme
ACE	Africa Clean Energy
ACERD	Association Congolaise pour les énergies renouvelables et décentralisées Congolese association for renewable and decentralized energies)
ACE-TAF	Africa Clean Energy - Technical Assistance Fund
ADALY	Averted disability adjusted life year
ADB	Asian Development Bank
ADB	Asian Development Bank
ADECOB	Association pour le developpement des communes du Borgou
ADELE	Access to Distributed Electricity and Lighting in Ethiopia (Worldbank)
ADES	Association pour le Développement de l'Energie Solaire
ADRA	Adventist Development and Relief Agency International Ethiopia
AECF	Africa Enterprise Challenge Fund
AEPC	Alternative Energy Promotion Center
AER	agence des energies renouvelables
AFD	Agence Française de Developpement
AfDB	African Development Bank
AIIB	Asian Infrastructure Investment Bank
AISER	Association interprofessionnelle des specialistes des energies renouvelables

AMADER	agence malienne pour le developement de l energie domestique et de l electrification rurale
AMANORM	agence malienne de normalisation et de promotion de la qualite
AMI	advanced metering infrastructure
ANADEB	agence nationale d appui au developpement a la base
ANER	Agence Nationale pour les Energies Renouvelables
ANM	Agence nationale de normalisation
ANSER	Agence Nationale des Services Énergétiques en milieu Rural (National agency for rural energy services)
AP	Annual Planning
APER	Association des Professionnels des Energies Renouvelables - Guinee
APIDA	Association pour la Promotion de l'Intercommunalité dans le Département de l'Alibori
ARMI	Association of Rural Mobilisation and Improvement
ARRA	Agency for Refugees and Returnees Affairs
ASER	Agence Sénégalaise d'Electrification Local
ASS	After Sales Services
ATVET4W	Agriculture Technical and Vocational Education & Training for Women
AVCP	Aquaculture Value Chain for Higher Income and Food Security in Malawi
AVSI	Association of Volunteers in International Service
AWBT	Adopted Water Boiling Test protocol
B2B	Business to business
BAD	banque africaine de developpement
BAU	business as usual
BBF	Bangladesh Bondhu Foundation
BCC	behaviour change campaigns
BDP	Productive Development Bank
BDS	Business Development Support
BECT	Biomass Energy Certification & Testing Center
BEP	Basic Education Program
BEST	Biomass Energy Strategy
BFP	Biodiversity and Forestry Programme (GIZ)
BIDS	Bangladesh Institute of Development Studies
BLEENS	Biogas, LPG, Ethanol, Electricity, Natural gas and Solar

BMM	Better Migration Management (GIZ)
BMU	the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BMZ	German Federal Ministry for Economic Cooperation and Development
BOAD	banque ouest-africaine de developpement
BoP	Bottom of pyramid
BoU	The Bank of Uganda
BRAC	Building Resources Across Communities
BRD	Rwandan Development Bank
BREB	Bangladesh Rural Electrification Board
BSTI	Bangladesh Standards and Testing Institution
BTL	below the line
BUET	Bangladesh University of Engineering and Technology
CAP	Bangladesh Country Action Plan for Clean Cook stoves
CAPEX	capital expenditure
CBI	Cash Based Interventions
CC	commune council
CC	clean cooking
CCA	Clean Cooking Alliance
CCAK	Clean Cooking Association of Kenya
CCC	Cleaner Cooking Camp
CCEWG	Commune Clean energy Working Group
CCS	clean cooking solutions
CCWC	Commune Committee for Women and Children
CD SG	Capacity Development Support to Governance
CDEAO	Communauté économique des États de l'Afrique de l'Ouest
CDM	Clean Development Mechanism
CEAP	Clean Energy Access Program
CEDAW	UN Committee on the Elimination of Discrimination against Women
CER	certified emission reduction
CES	Cooking Energy System
CESC	Community Electrification Sub-component



CESPA	Cambodian Efficient Stove Promotion Association
CGeD	Gender and Development Unit
Ci-Dev	Carbon Initiative for Development
CIDP	Turkana County Integrated Development Plan
CLASP	Collaborative Labeling and Appliance Standards Program
CLASP	Collaborative Labeling and Appliance Standard Program
CM	Chitetezo Mbaula
CMS	Customer Management System
CO	Carbon monoxide
COMSIP	Community Savings and Investment Promotion
COOPI	Cooperazione Internazionale (Italy)
COP	Conference of the Parties
CRED	Community Rural Electrification Department
CREDD	Cadre Stratégique pour la Relance Économique et le Développement Durable
CREDELEC	computer management platform for prepaid electricity
CREE	Community Rural Electrification Entities
CREEC	Centre for Research in Energy and Energy Conservation
CREF	Central Renewable Energy Fund
CREP	Community Rural Electrification Programme
CRGE	Ethiopia's Climate-Resilient Green Economy
CRRF	Comprehensive Refugee Response Framework
CSO	Civil society organisation
CUSP	Civil Society Support Programme
DANIDA	Danish International Development Agency
DBE	Development Bank of Ethiopia
DC	Direct Current
DESFERS	Développement économique et social des femmes a travers les energies renouvelables au Sahel (Senegal, Mali et Niger)
DEZA/ SDC	Swiss Agency for Development and Cooperation
DfID	the UK Department for International Development
DFS	decentralised finance services
DGRE	General Directorate of Energy Ressources of the Ministry of Energy Benin

DHS	demographic and health survey
DIAPOL-CE	Dialogue Politique sur Les Stratégies D'adaptation et D'atténuation
DKTI	The German Climate and Technology Initiative
DNE	Designated national entity
DOE	Designated operational entity
DoEYS	Department of Education, Youth and Sports
DORCAS	Dorcas=Tabitha, Bible Name: (Dutch Volunteer Network)
DP	Development Partner
DRC	Democratic Republic of the Congo
DSS	Demand side subsidy
DST	Department of Science and Technology
E4D	Employment for Development
E4I	Energy for Impact
EAMD	Energy Access Market Development
EASP	Electricity Access Scale-Up Project
EASUSII	Energy Access Use Situation Survey II
ECCAA	Ethiopian Clean Cooking Alliance Association
ECOWAS	Economic community of West African States
EDCL	Energy Development Corporation Ltd (subsidiary of REG)
EDM	Electricidade de Moçambique / Energy Public Utility
EDM	Energie du Mali
EE	energy efficiency
EEA	Ethiopia Energy Authority
EEGIRE	Energy Efficiency and Grid Integration of Renewable Energy Project, GIZ
EEU	Ethiopian Electric Utility
EFCCC	Environment, Forest and Climate Change Commission
EforA	Efficiency for Access Coalition
EGEC	Ethiopian-German Energy Cooperation
EJASA	Youth Employment for Food Security Improvement
EMPODERAR	Empower, a national programme of the Bolivian Ministry of Rural Development and Land
Enabel	Belgian Development Agency

ENDE	National Enterprise for Energy, Bolivia
EnDev	Energising Development programme
ENUFF	Enhancing Nutrition of Upland Farming Families
EODB	Ease of Doing Business report
EOI	Expression of Interest
EPA	Agence de promotion de l'emploi
EPC	Electric Pressure Cookers
EPR	extended producer responsibility
EPRA	Energy and Petroleum Regulatory Authority
EREDPC	Ethiopian Rural Energy Development and Promotion Centre
ERIL	Electrification Rurale à Initiative Locale
ERs	Emission reductions
ESAP	Energy Sector Assistance Programme
ESDS	Energy Solutions for Displacement Settings
ESEDA	Ethiopian Solar Energy Development Association
ESMAP	Energy Sector Management Assistance Programme
ESSP	Energy Sector Strategy Plan
ESWG	Energy Sector Working Group
EU	European Union
EU/RECASEB	European Union / Renforcement des Capacités des Acteurs du Secteur de l'Energie au Bénin
EUCL	Energy Utility Corporation Ltd (subsidiary of REG)
EUD	the European Union Delegation
FA	financial assistance
FAO	Food & Agriculture Organisation of the United Nations
FASER	Fundo de Acesso sustentável as energias renováveis em Moçambique / Fund for Sustainable Access to Renewable Energies and Efficient Technologies
FASERTe	Fund for Sustainable Access to Renewable Energies and Efficient Technologies
FASN	National Solidary Aid Fund
FCA	Federal Cooperative Agency
FCDO	The UK Foreign, Commonwealth and Development Office
FCDO	Foreign and Commonwealth Office

FDC	Fundação para o Desenvolvimento da Comunidade / Foundation for the development of the Community
FECECAM	FAITIERE DES CAISSES D'EPARGNE ET DE CREDIT AGRICOLE MUTUEL
FENAPHAB	federation nationale des huiles et aliments pour betail
FENASCOM	National Federation of Community Health Associations
FI	Financial Institution
FNSP	Food and Nutrition Security Programme
FSD	financial systems development
FSSP	Forestry Sector Strategic Plan
FTE	full time employment
FUNAE	Fundo Nacional de Energia / National Energy Fund
GA	gender analysis
GACC	Global Alliance for Clean Cookstoves
GAP	gender action plan
GBE	Grüne Bürgerenergie –Citizens' Green Energy Programme (BMZ)
GBV	Gender based violence
GCCA+	Global Climate Change Alliance Plus
GCF	Green Climate Fund
GCR	Global Compact on Refugees
GDC	Global Distributors Collective
GDP	Gross Domestic Product
GERES	Groupe Energies Renouvelables, Environnement et Solidarités
GERME	Groupes d'Entraînement et de Réflexion au Management des Entreprises
GESI	Gender Equity and Social Inclusion
GFL	Governance, Forest Landscape and Livelihoods
GFP	Gender Focal Point
GHG	Greenhouse Gas
GIC	Groupement intercommunal des Collines
GIE	Groupement d'intérêt Economique
GIS	geographic information system
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

GoB	Government of Bangladesh
GoDRC	Government of the Democratic Republic of Congo
GOGLA	Global Off-Grid Lighting Association
GoL	Government of Laos
GoM	Government of Malawi
GoM	Government of Mozambique
GoN	Government of Nepal
GoR	Government of Rwanda
GoSN	Government of Senegal
GoT	Government of Tanzania
GTI	Government Technical Institutes
GTP	Growth and Transformation Plan
HAP	Household Air Pollution
HDP	humanitarian, development, peace
HEP	Household Energy Platform
HH	household
HH	Household
HQ	Headquarter
IADB	Inter-American Development Bank
IAP	Indoor air pollution
ICRC	International Crescent of the Red Cross
ICS	improved cookstoves
ICT	Information and Communication Technology
ID Poor	Identified as poor on the official Poverty list
IDCOL	Infrastructure Development Company Limited
IDE	International Development Enterprises
iDPP	Integrated Development Partnership
IFC	International Finance Corporation (Sister of Worldbank)
IICA	Inter-American Institute for Cooperation on Agriculture
IKI	International Climate Initiative
ILA	International Lead Association
INDC	Intended Nationally Determined Contributions

INEP	independent nano energy providers
INFOCAL	National Institute for Labor Education and Training
INNOQ	National Institute for Normalization and Quality
INRAB	National Institute for Research in Agriculture
IP	Implementing partner
iPAC	integrated Peace and Conflict Analysis
IPCA	Integrated Peace and Conflict Analysis
IRENA	International Renewable Energy Agency
IREP	Institute of Renewable Energy Promotion
IRR	Internal Rate of Return
IRS	Institutional Rocket Stove
ISCC	Integrated Solutions for Clean Cooking
ISO	International Organization for Standardization
ITAC	independent technical advisory committee
ITC	Institute of Technology of Cambodia
ITU	International Telecommunications Union
IVA	Independent Verification Auditor
KEBS	Kenya Bureau of Standards
KEREA	Kenya Renewable Energy Association
KfW	KfW Development Bank
KISED DP	Kalobeyei Integrated Socio-Economic Development Plan
KKCF	Kakuma & Kalobeyei Challenge Fund
KNES	Kenya National Electrification Strategy
KOFIH	Korea Foundation for International Healthcare
KOSAP	Kenya Off-grid Solar Access Programme
KS	Kenyan Shilling
LA	Local authority
LDWDC	Lao Disabled Women Development Centre
LEAP	Liberia Energy Access Practitioners
LEMA	Laboratory of Energetics and Applied Mechanics at the University of Abomey Calavi
LG	Lighting Global
LGU	Local Government Units

LME	last mile entrepreneur
LNOB	leave no one behind
LOKADO	Lotus Kenya Action for Development Organization
LPED	Local and Provincial Economic Development
LPG	Liquefied Petroleum Gas
LWF	Lutheran World Foundation
LWU	Lao Women Union
M-ACC	Mali Alliance for Clean Cooking
MACRA	Malawi Communications Regulatory Authority
MAF	Ministry of Agriculture and Forestry
MASMF	Ministry of Social Affairs and Micro Finance Benin
MBEA	Market Based Energy Access
MBS	Malawi Bureau of Standards
MCA	Millenium Challenge Account
MCHF	Modern Cooking for Healthy Forests
ME	modern energy
ME	Ministry of Energy
MECS	Modern Energy Cooking Services
MEDD	Ministry of Environment and Sustainable Development, Senegal
MEM	Ministry of Energy and Mines
MEMD	Ministry of Energy and Mineral Development
MEPS	Minimum Energy Performance Standards
MFI	Micro-finance institution
MFME	Ministry of Fisheries and Maritime Economy, Senegal
MGHP	Malawi German Health Programme
MHDF	Micro Hydro Debt Fund
MHP	micro-hydro power
MIERA	More Income and Employment in the Rural Areas of Malawi
MINEDH	Ministério de Educação e Desenvolvimento Humano / Ministry of Education and Human Development
MININFRA	Ministry of Infrastructure (in charge of energy)
MINUSMA	United Nations Multidimensional Integrated Stabilization Mission in Mali



MIREME	Ministério dos Recursos Minerais e Energia / Ministry of Energy
MISAU	Ministério da Saúde / Ministry of Health
MoE	Ministry of Environment
MoE	Ministry of Energy
MoHCDGEC	Ministry of Health, of Community Development, Gender, Elderly and Children
MoNRE	Ministry of Natural Resources and environment
MoST	Ministry of Science and Technology
MoU	Memorandum of Understanding
MoWIE	Ministry of Water, Irrigation and Energy
MPE	Ministry of Petroleum and Energy, Senegal
MPEMR	Ministry of Power, Energy and Mineral Resources
MRD	Ministry of Rural Development
MRV	Monitoring Reporting and Verification
MSE	Micro and small enterprise
MSME	Micro, small and medium enterprise
NACUEN	National Association of Community Electricity Users Nepa
NAMAs	Nationally Appropriate Mitigation Actions
NAP	National Action Plan (NAP) for Clean Cooking in Bangladesh 2020-2030
NAPAs	National Adaptation Programme of Action
NB	Nota bene
NBPE+	National Biogas Programme Ethiopia
NCCAP	National Climate Change Action Plan
NCSC	National Cookstove Steering Committee
NDA	National Designated Authority
NDC	Nationally Determined Contributions
NDP	National Development Plan
NEA	Nepalese Electricity Authority
NEEP	Nepal Energy Efficiency Program
NEF	Nepal Energy Foundation
NEP	National Electrification Plan
NGO	Non-governmental organisation
NIS	Nordic International Support Foundation

Norad	Norwegian Agency for Development Cooperation
NRC	Norwegian Refugee Council
NRREP	National Rural and Renewable Energy Programme
NSFP	National School Feeding programme
NST	National Strategy for Transformation
NUFFIC	organisation néerlandaise pour l'internationalisation de l'éducation
OCEF	Facilité d'Énergie Propre Hors Réseau
OCS	outcome calculation sheet
ODA	Official Development Assistance
ODF	Open Defecation Free
OFID	OPEC Fund for International Development
OGS	Off-Grid Solar
OMM	Operations, Management and Maintenance
ONG	NGO
OPEX	operational expenditure
PA	Practical Action
PADER	Plan d'Action National d'Energies Renouvelables
PADERAU	Programme d'Appui au Développement des Energies Renouvelables pour l'Accès Universel à l'Electricité
PAH	polyaromatic hydrocarbons
PALS	Participatory Action Learning for Sustainability
PAYG	Pay as you go
PAYGO	Pay-As-You-Go
PDR	Peoples' Democratic Republic
PED	Programme Energie Durable
PESERE	Programme d'Enseignement Supérieur pour les Energies Renouvelables et l'Efficacité Energétique
picoPV	pico photo voltaic
PMSD	Participatory Market System Development
PND	National Development Plan
PoA	programme of activities
POGEP	Regional Off-Grid Electrification Project
PONADER	Politique nationale de développement des énergies renouvelables

PO-RALG	President's Office of Regional and Local Government
PPE	Personal Protective Equipment
PPP	private public partnership
PREEEP	Promotion of Renewable Energy and Energy Efficiency Programme
PREMS/ASER	Projets Energétiques Multisectoriels
ProAgri4	Programme de l agriculture
ProCIVA,	Programme global Centres d'innovations vertes pour le secteur agro-alimentaire
ProFINA	Programme de promotion du financement de l agriculture
ProMERC	Programme de promotion d un marche de l electricite respectueux du climat
ProSAR	programme de securite alimentaire et du renforcement de la resilience
PSFU	Private Sector Foundation of Uganda
PSP Hydro	Private sector participation in hydro power
PSPE	Private Sector Participation in the Generation and Distribution of Electricity from Renewable Sources (Enabel project)
PTT	Prototype Tested (working name for certain stove designs)
PU	productive use
PU / PUE	Productive use / Productive use of energy
PUDC	Programme Urgence de Développement Communautaire
PUE	productive use of energy
PUM	Programma Uitzending Managers
PV	Photovoltaic
PWD	People with Disabilities
QEP	Qualifications and Employment Perspectives for Refugees and Host Communities in Ethiopia Programme (GIZ)
QLF	Quality of Life Foundation
R&D	Research and development
R+D+I	Research, Development and Innovation
RBF	Results-based financing
RBF	Results-Based Financing
RBI	Results Based Incentive
RBT WAP	Programme reserve de biosphere transfrontaliere de la region des parcs nationaux W, Arlyet et Pendjari
RE	Renewable Energy

REACT	Renewable Energy and Adaptation to Climate Technologies
REASL	Renewable Energy Association of Sierra Leone
RECASEB	Programme d'Appui institutionnel et de renforcement des capacités des acteurs du secteur de l'énergie au Bénin
ReCIC	Reducing Climate Impact of cooking in Rwanda through improved cooking systems (EU-cofinancing und GCCA+)
REDP	Rural Energy Development Programme
REEEP II	Renewable Energy and Energy Efficiency Programme II, GIZ
REF	Renewable Energy Fund
REG	Rwanda Energy Group
REIAMA	Renewable Energy Industry Association of Malawi
REMI	Renewable Energy and New Materials Institute
RENAC	The Renewables Academy AG
RERA	Renewable Energies for Rural Areas
REREC	Rural Electrification and Renewable Energy Corporations
RERL	Renewable Energy for Rural Livelihood
RES	Rural Electrification Strategy
RETS	Renewable Energy Test Stations
RF	Revolving Fund
ROGEP	regional off-grid electrification project
RREA	Rural and Renewable Energy Agency
RVO	Rijksdienst voor Ondernemend Nederland/ Netherlands Enterprise Agency
S&L scheme	Standards and labelling scheme for energy efficient appliances
S4PU	solar for productive use
SANADO	commune of Sanado
SCCIF	Smart Communities Coalition Innovation Fund
SCI	Solar Cookers International
SDC	Swiss Development Cooperation
SDG	Sustainable Development Goal
SE4All	Sustainable Energy for All
SECCS	Strengthening Enabling Environment of Clean Cooking Sector
SENELEC	Société Nationale D'électricité Du Sénégal
SFV	Smoke Free Village

SGBV	Sexual and Gender-Based Violence
SHS	solar home systems
SI	Social Institutions
SIDA	the Swedish International Development Cooperation Agency
SIGI	Social Institution and Gender Index
SIINC	Social Impact Incentives
SMA	Marque de produit électronique d'une Entreprise allemande qui fabrique des onduleurs pour installations photovoltaïques
SME	Small and medium-sized enterprise(s)
SNE	National Electrification Strategy
SNNP	Southern Nations, Nationalities, and Peoples' Region in Ethiopia
SNV	Stichting Nederlandse Vrijwilligers / Netherlands Development Organisation
SPG	Stove Production Group
SPP	Social Protection Program
SPU	Stove Production Unit
SREDA	Sustainable and Renewable Energy Development Authority
SSC	Stove Selection Committee
SSH4A	Sustainable Sanitation and Hygiene for All
SSHM	Solar Stakeholder Meeting
STEM	Science, Technology Engineering, Mathematics
STEP	Ethio-German Sustainable Training and Education Programme
TA	Technical Assistance
TANGSEN	Tanzania Gender and Sustainable Energy Network
TAREA	Tanzania Renewable Energy Association
TATEDO	Tanzania Traditional Energy Development Organization
ToC	Theory of Change
TVET	Technical and Educational Training
UC/PDER	Unité Chargée de la Politique de Développement des Energies Renouvelables
UECCC	Uganda Energy Credit Capitalization Company
UEM	Universidade Eduardo Mondlane / Eduardo Mondlane University
UEMOA	Union Economique et Monétaire Ouest Africaine
UIRI	Ugandan Industrial Research Institute

ULAB	Used-Lead Acid Battery
UNACC	Uganda National Alliance on Clean Cooking
UNACooPFA	Union nationale des cooperatives de production des foyers ameliores
UNBS	Uganda National Bureau of Standards
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UOMA	Off-grid Market Accelerator
USAID	the United States Agency for International Development
USD	United States Dollar(s)
USEA	Uganda Solar Energy Association
VAT	Value Added Tax
VC	Village Chief
VER	Verified Emission Reduction(s)
VITA	Irish Development Partner (before 2005: RTI Refugee Trust International)
VPO	Vice President's Office of Environment
VSL	Village Savings and Loan
VSLA	Village savings and loan association
WASH	water, sanitation and hygiene
WB	World Bank
WB/PASE	World Bank / programme d amelioration des services energetiques
WBT	Water Boiling Test
WE4F	Water Energy for Food
WEEK	Women Energy Entrepreneurs in Kenya
WFP	World Food Programme
WHH	Welthungerhilfe
WHO	World Health Organisation
WIRE	Women in Rwandan Energy
WONEE	Women Network in Energy and Environment

WS	Wood Stoves (refers to a specific cookstove model)
WTP	Willingness to pay
WVI	World Vision International
WWF	World Wide Fund For Natur
ZOA	Zuid Oost Azie (Dutch NGO and Dutch for: South East Asia)



**Funded by:**



Ministry of Foreign Affairs of the Netherlands



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

**Swiss Agency for Development  
and Cooperation SDC**

**Coordinated and implemented by:**



Netherlands Enterprise Agency

**Published by:**

Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH  
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As of: July 01, 2021  
(final version)

# Energising Development Programming Report 2021 Update Annex B

2021

### **Partnership between**

**The German Federal Ministry for Economic Cooperation and Development**

**The Netherlands Ministry of Foreign Affairs**

**The Norwegian Agency for Development Cooperation**

**The Swiss Agency for Development and Cooperation**

With co-financing from the **Australian Department of Foreign Affairs and Trade, the European Union, Icelandic International Development Agency, IKEA Foundation, Irish Aid, Korea Foundation for International Healthcare, Swedish International Development Cooperation Agency, the UK Foreign, Commonwealth and Development Office, and the United States Agency for International Development**

### **Coordinated and implemented by**

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Rijksdienst voor Ondernemend Nederland (RVO)

Association pour le Développement de l'Energie Solaire Suisse (ADES)

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Collaborative Labeling and Appliance Standard Program (CLASP)

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Netherlands Development Organisation (SNV)

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# Context and introduction

Annex B integrally compiles the external review of the country proposals by EnDev's Independent Technical Advisory Committee (ITAC) and strategic partners on strategic orientation, economic feasibility and gender. The external review was conducted in a three-stage process.

The ITAC, consisting of the Clean Cooking Alliance (CCA), Energia, and the World Bank/ ESMAP was involved in the programming process of EnDev for the first time in 2019. EnDev's strategic partners were offered the final proposals for a review and suggestions to selected countries. In 2021, the process was revised, and the external review was conducted in a three-stage process. This year's ITAC consisted of four consultants recommended by Energia and the World Bank to have a particular look at the business case and gender approach of each EnDev country project. In addition, EnDev offered a review to its strategic partners, the Clean Cooking Alliance and the World Bank/ ESMAP.

## Three stage review process

Draft proposals were reviewed by EnDev and the ITAC, and jointly discussed in a two days pressure cooker session in March 2021 (**stage one**). **Stage two** contained a final review by the ITAC to see to what extent feedback from stage one has been incorporated into the proposals and

planning. In addition, EnDev offered the proposals for a review and suggestions to selected countries to its strategic partners the Clean Cooking Alliance and World Bank/ ESMAP (**stage three**). **All comments received at stage two and three are included in this annex in Chapter 2.** In addition to the country-specific reviews, the ITAC offered general observations with regards to gender at portfolio level which is presented in Chapter 3.

The reviewers based their findings on the proposals and supporting documents –i.e. projects's theories of change (ToCs) –, their basic understanding and knowledge of the EnDev programme, and their in-depth knowledge of the sector and broad experience in a variety of countries where EnDev is operating in. Interviews with EnDev staff on the ground, Q&A for elaboration and better understanding were not part of the review. EnDev management very much welcomes the constructive and critical comments of the reviewers.

# 1. Review of country proposals by the ITAC and strategic partners

	ITAC	Strategic Partners
Bangladesh	<p><b>Finale feedback on business case by consultants</b></p> <p>Many thanks to the Bangladesh EnDev team for the thorough answers to our comments.</p> <p>a) <b>Broad strokes at country level</b></p> <ul style="list-style-type: none"> <li>solar battery charging for e-rickshaws: The team explains that previous pilots were discontinued as they could not prove financial viability. We agree with the allocated budget for the proposed pilot with an outlook to demonstrate commercial viability. The leverage approach to link potential investors with IDCOL's and commercial bank's debt financing for net-metering and green soft loans sounds sensible and is important, if the pilot's success is measured by its result to scale and replicate. It will be important for the team to be able to access additional funding (through re-allocation under EnDev proposal or other sources) if the proposed pilot (with respective budget) doesn't achieve quite yet the proof of commercial viability at once and if financiers require further evidence and trust-building towards the proposed technology before they lend to investors, assuming the investors themselves pass 'due diligence'. It is stated in the proposal that IDCOL's net-metering funding has not been much used (are eligibility criteria too onerous?). Potentially, the DKTI programme could bridge this gap.</li> <li>Financing needs of Bangladesh-based manufacturers (complementing the RBF): The proposed CCA's venture catalyst support targets companies beyond the 'proof of concept' stage</li> </ul>	<p><b>Clean Cooking Alliance</b></p> <p><b>Standards and Labelling for E cooking</b> CCA is happy to coordinate and share our learnings from similar work in other countries like Nepal</p> <p><b>Awareness and Behavior Change</b> While we are not planning any campaigns, we would be happy to share our experiences and coordinate if there is an opportunity</p> <p><b>Support to HEP</b> CCA has provided grant support to HEP in the past and happy to share learnings and coordinate with our efforts around supporting local alliances in other countries.</p> <p><b>Coordination and Implementation of the NAP</b> CCA is happy to support coordination between Endev and other players like the WB's IDCOL program. Since the NAP was submitted to SREDA in 2020, CCA has not heard back on their plans for launching and starting implementation. CCA is happy to support coordination efforts for implementation of the NAP</p> <p><b>Gender</b> Great to see that each project has undergone a gender analysis and will include specific provisions to ensure gender is mainstreamed throughout the project. CCA is happy to continue</p>

	<p>that 'have been deemed to have high growth potential or which have demonstrated high growth'. We agree that this can help provide much needed capital for business operations, however, only for those that are established businesses. We encourage the team to be more ambitious and explore/offer other types of financing (such as start-up/expansion/incubation grants), if the manufacturer base is to be expanded and products / business models to be innovated.</p> <p><b>b) Portfolio level</b>  Liaison between IDCOL and BBF: We understand that IDCOL and BBF are the two key players in the cookstove market, however, a close collaboration doesn't seem to exist, apart from coordination meetings. In our earlier comment, we encouraged the team to explore and identify ways for IDCOL and BBF to closer collaborate. We are aware that both institutional set-ups are different, which can also be a plus as for the type of intervention that each of them can mutually offer to accelerate market development and ideally help to strengthen BBF's financial sustainability in the long run. Would it be an idea to launch an assignment that looks into each's type of interventions, assesses their complementarities and gaps and makes recommendations where IDCOL's and BBF's types of interventions to private sector can be mutually strengthened and aligned?</p>	<p>to coordinate on mutual lessons learned from integrating gender into clean cooking initiatives</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>The proposal takes on board several suggested changes in the text, including the suggestion to include a small action research component in the BCCs. Sex disaggregated target (100% women) has specifically been mentioned as part of results. One of the comments was to include higher order women's empowerment related targets into the programme. However, the team has clarified that since EnDev's contribution to the overall cookstoves programme is very small, and that the systems are set up already (the programme started in 2018), it is difficult to make these changes at this point. The team mentions that "It would be a worthwhile endeavor if EnDev and BBF would have designed the BCD intervention from the beginning with women empowerment in mind", which corroborates the merit in gender mainstreaming right from the beginning of a programme. It is good to hear that BBF is</p>	<p><b>World Bank/ ESMAP</b></p> <ul style="list-style-type: none"> <li>• E-cooking and battery charging station both need to be compared side by side in terms of their potential impact on BREB distribution network. Apparently, the cumulative load of e-cooking is encouraged whereas that has been identified as a burden on BREB network when it argues for solar charging station. Both the interventions are believed to have several benefits from user perspective but not the same from the discom's perspective. It is either better to be limited to user angle or make a thorough assessment from utility's perspective.</li> <li>• Battery charging station part lack of technical specification, implementation model for piloting; e-cooking also not</li> </ul>



	<p>undertaking a gender analysis which will result in a gender equality policy, at least for the organization itself.</p>	<p>defined technology wise. Theory of changes could be further strengthened specially for the Electricity part.</p> <ul style="list-style-type: none"> <li>The ICS efforts highlighted need to understand the complementarity across all ICS programs in Bangladesh and not just the Bondhu Chula program. There are efforts in place, which will end up being replicated if they are not reflected well in the program here</li> </ul>
<p>Benin</p>	<p><b>Finale feedback on business case by consultants</b></p> <p>Many thanks to the Benin EnDev team for the reactions to our comments, which could have been a bit more substantiated in the response matrix.</p> <p>a) <b>Broad strokes at country level</b>  RBF grants for private sector: In the previous proposal, RBF was mentioned several times, related to e-waste, PU and last mile, ICS. Back then, our recommendation was to revisit the proposed RBF structure and to simplify; for instance, e-waste elements could be mainstreamed into RBF grants for last mile and PU, instead of launching a separate RBF e-waste (only an example). It seems that since that first review a shift in strategy has taken place. The final proposal states that RBF grants will only be made available, if additional funding can be sourced. We think that it is key for private sector players to access financial support, for instance in the form of RBF grants and other types of grants (start-up/expansion/incubation grants for new product entries and pilots!) in order to build out their distribution networks, enter into partnerships, test business models, etc. We agree that market building interventions are important but, based on our experience, they should go hand in hand with offering financial support to the private sector. Can the Benin team please explain? We believe that the budget of more than EUR 6 million may be able to accommodate RBF grants.</p> <p>b) <b>Portfolio level</b>  None.</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>

	<p><b>Finale feedback on gender by consultants</b></p> <p>The revised proposal for Benin now includes sex-disaggregation of indicators related to w/m participation, jobs, ownership of businesses, and PUEs. It expands Ch 8 on Gender Strategy to include the results of the GA report. The team has many good ideas for actions but points out that additional budget is needed to implement more of these, and to hire a national gender expert. This is a key point for EnDev to consider in all projects.</p> <p>Achievements to date, and the baseline that is to be built on (eg see %s above from previous proposal), are still not well presented. Capacity-building needs in the team and partners are also not mentioned, although identification of further actions is planned as part of the internal process of definition of the detailed operational plan for EnDev Benin.</p>	<p><b>World Bank/ ESMAP</b></p> <p>No comments</p>
<p>Bolivia</p>	<p><b>Finale feedback on business case by consultants</b></p> <p>Thanks to the Bolivia EnDev team for the reactions to our comments, however, a yes/no answer to almost all comments in the response matrix didn't necessarily guide our understanding on whether and how the team has reflected them in the final design.</p> <p>a) <b>Broad strokes at country level</b></p> <ul style="list-style-type: none"> <li>• E-Waste: Great to read that the matter of e-waste has been incorporated into the project design.</li> <li>• Rehabilitation of solar systems in rural schools: Promoting extracurricular activities to collect funding for maintenance can certainly help cover parts of the costs. However, as for the replacement costs (depending on the systems size and design), and based on our experience, these are usually much higher. We, therefore, recommend to make a sustainability plan part of the deliverables and to scope for alternative income streams for rural schools that can be systematized in the long term.</li> </ul> <p>b) <b>Portfolio level</b></p> <p>Exit strategy: Given EnDev's unique role in the environment in Bolivia, what exit strategy is envisaged by EnDev (and for when), especially as FASERTe was originally created as the main exit strategy for EnDev in Bolivia. Interested in your assessment.</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>

	<p><b>Finale feedback on gender by consultants</b></p> <p>The proposal was already very good. It is further strengthened. All comments have been addressed. Good identification of activities and categorized by practical, productive and empowerment oriented. Target have been disaggregated by sex</p>	<p><b>World Bank/ ESMAP</b></p> <p>No comments</p>
Burundi	<p><b>Finale feedback on business case by consultants</b></p> <p>Thanks to the Burundi EnDev team for the reactions to our comments.</p> <p>a) <b>Broad strokes at country level</b>  GIZ and AVSI: From reading the final proposal, on one hand, it is positive that there is a continuation of GIZ activities with AVSI, on the other hand, we get the impression that the new EnDev implementer didn't have a lot of room to design and shape the intervention himself.</p> <p>b) <b>Portfolio level</b>  Positioning of new EnDev implementer in Burundi. We understand from AVSI's responses to our comments that it is envisaged to continue with what GIZ has initiated back in 2017. We think that a closer look at the current market with a couple of new players in country may slightly require revisiting proposed activities. There are two new major programs by EU and World Bank that will intervene in the ICS sector. We think that the key questions to ask are 'How to make a small budget valuable for scale and transformation?' and 'What can EnDev finance that will also leverage the other programs?'</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>The revised proposal for Burundi now includes detailed sex-disaggregated indicators and some targets: On time/health impacts, participation in the value chain, and awareness, that are to be established through a baseline survey and later evaluation. It is good (and ambitious) to propose quantitative % targets. A suggestion is to also sex-disaggregate indicators 4,5,6 unless this is intended by 3,6 (but there is no 3??).  We are still not provided with the results of the previous phase (impacts, training, jobs), challenges, and lessons learned)? Efforts to encourage women's participation are mentioned, but specific</p>	<p><b>World Bank/ ESMAP</b></p> <p>WB team has been in close contact with GiZ-Endev team from the beginning of project design and recently conducted a joint WB-GiZ-AVSI call. It is great to see that GiZ scaled up the support from 20,000 Bikigiti stoves in 2019 to 28,000 in 2020, which seems feasible albeit challenging since it is also the period of technical support. One concern about the target is that 28,000/12month/12producers=circa 200/per producer and only 5 are noted to produce more than a 100, so some must be producing significantly more than a 100. It would be good to</p>

measures to ensure women entrepreneurs' success or quotas are not given.  
Like other proposals, the budget still does not specify allocation for gender activities.

connect on the mass-producing/quality aspect of work in the future.

The approach proposed is sound: focusing on Bikigiti stove (mostly the clay one – for affordability reasons) that provides continuity within Endev partners, is already known, affordable and has been disseminated at scale. One question is that whether more could be done on the metal version to broaden a bit the customer base. The problem is import and access to forex, a situation to which the WB Nyakiriza project may be able to provide some support. Another question is that whether for rural areas, the charcoal option (with an insert added) is used enough to justify a dual stove and whether a wood-only version could be optimized further.

It is good to see that the references made to the WB project work, from the market study (which still leave quite a bit unexplained as it was primarily solar-focused) to the expected cooperation on multiple fronts, the first being related to the contact and cooperation with the GoB. The WB team could foresee a significant level of complementarity between the two activities, Endev being able to provide on-the-ground TA to producers and WB being able to support the finance investments and development of these producers/distributors.

The WB team will be re-testing the Bikigiti among other stoves and against the baseline(s), using a controlled Cooking Test while working towards defining a simplified contextual adapted water boiling test at a later stage. But the WB team does not expect the savings results to be significantly different. It is more to set a similar ground situation across all types of stoves that may seek to be eligible for funding in the future. Initial contacts have been established with GiZ-AVSI teams on this.

What remains unclear is the link & complementarity to the other AVSI-EU funded budget and tasks. Perhaps it's because it is not under AVSI-Endev but just AVSI but there are overlaps and the stove targets are much lower (11,000) while the budget is much more significant.

		WB team looks forward to working with the EnDev team and continuing the conversations.
Cambodia with Laos	<b>Finale feedback on business case by consultants</b>	<b>Clean Cooking Alliance</b>
	No additional comments	No comments
	<b>Finale feedback on gender by consultants</b>	<b>World Bank/ ESMAP</b>
	The proposal focuses completely on clean cooking. Women's role in stove production as well as benefits for women was already highlighted. Gender disaggregated targets have been clarified now: A total of 30 producers (50% female headed), 15 distributors (25% female operated), and 1,600 retailers (70% female operated) will be capacitated to provide quality products and services.	<ul style="list-style-type: none"> <li>• Not sure how recent this documentation is, especially in some cases the Ministries that are referred to do not exist anymore in the country.</li> <li>• It would be great for the teams (WB &amp; EnDev) to discuss further to assess synergies in the work on the ground. However, we continue to be a bit restricted as the two programs have very different focus. In particular in Lao PDR where EnDev/SNV will continue their focus on traditional biomass cooking (charcoal and wood). Their proposal specifically notes that promotion of higher tier stoves in Lao is not viable, which runs counter to the government request.</li> <li>• In Cambodia, there may be more scope for synergies, as their focus will also be on e-cooking. So, there might be more room for discussion and figuring out how the programs can complement each other.</li> <li>• The most viable areas of coordination may be through their communications campaigns in both Lao and Cambodia (BCC, SFV); as this is an area of interest to both programs. I.e. to ultimately change behaviors. However, in Lao this would mean integration of higher tier stoves in their communications campaigns and the health issues surrounding use of wood and charcoal.</li> </ul>
Democratic Republic of the Congo (DRC)	<b>Finale feedback on business case by consultants</b>	<b>Clean Cooking Alliance</b>
Many thanks to the DRC EnDev team for the thorough answers to our comments. Much appreciated.	No comments	
	a) <b>Broad strokes at country level</b> Quality of proposal: We want to applaud the team for doing an excellent work for improving the quality of the final proposal. Appreciated the Annex on the Matching Grant scheme for PUE products.	

	<p>b) <b>Portfolio level</b>  Counterpart GoDRC: Only comment that remains is to identify a champion on the GoDRC side and to ensure a close linkage with ANSER and the national MWINDA Fund that is being designed.</p>	
	<p><b>Finale feedback on gender by consultants</b></p> <p>The revised proposal for DRC has clarified sex-disaggregated indicators and targets for production, value chain, training and awareness. The GA report has been added to the documentation and is reflected in the revised proposal. Studies on consumer behavior and market assessment include gender issues. Interventions such as business training and facilitation of credit are identified by the project for targeting to women to overcome barriers. The GA identifies questions that need to be clarified in the baseline study, in order to measure against indicators:</p> <ul style="list-style-type: none"> <li>• What is the percentage of female workers in the ICS production workshops?</li> <li>• What is then number of ICS saleswomen and promoters or associations in the implementation areas?</li> <li>• What could be the hidden barriers to ICS value chain for women that have not been identified?</li> </ul>	<p><b>World Bank/ ESMAP</b></p> <p>No comments</p>
Ethiopia	<p><b>Finale feedback on business case by consultants</b></p> <p>Many thanks to the EnDev Ethiopia for their extensive revamp of the proposal, which takes into account the comments on streamlining and clarifying the initial proposal</p>	<p><b>Clean Cooking Alliance</b></p> <p><b>ECCAA Support</b>  CCA will be happy to continue to share our learnings from supporting local alliances and coordinate as appropriate</p> <p><b>Support for companies/E-cooking</b>  CCA will coordinate on companies within its VC portfolio that are currently operating in Ethiopia (currently Obama Stove) and those interested in entering the Ethiopian market. CCA would also be happy to contribute ideas and suggestions for EnDev efforts to move its “graduates” into more industrialized operations</p> <p><b>Standards and labeling</b>  CCA will be happy to continue to coordinate on efforts to support implementation of standards and labeling programs</p> <p><b>Gender</b></p>

		<p>Great to see that each project has undergone a gender analysis and will include specific provisions to ensure gender is mainstreamed throughout the project. CCA is happy to continue to coordinate on mutual lessons learned from integrating gender into clean cooking initiatives</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>Good to see a strong component of enabling environment in the proposal.  Gender targets included as requested, in PUE, mini grids, ICS, as well as sex disaggregated data to be collected as part of COVID response tracking.  The team will work with ENERGIA to strengthen the gender component further. As such, the project gender analysis which was undertaken in 2017 is currently being revised</p>	<p><b>World Bank/ ESMAP</b></p> <ul style="list-style-type: none"> <li>• Many overlaps can be found on mini-grids. For example, the EnDev support includes “Digitalization of the off-grid sector in this programming phase as a hub for better identification of and decisions on mini-grid sites” as well as “business development support”. This seems to overlap with the off-grid tracking and procurement platform financed by the WB as well as transaction advisory and capacity building support provided to EEU’s off-grid unit. <b>I would suggest the respective teams to have a follow up conversation.</b></li> <li>• The work on mobile money and payment systems neatly overlaps with the work the Bank team has been doing as part of the off-grid solar policy tool and the technical assistance provided by ADELE. The Bank and EnDev team are already closely coordinating these activities.</li> <li>• The proposal states that for e-waste extended producer responsibility will be employed. This is a heavy step, esp. if there is no recycling infrastructure. Would be good if EnDev can do more open-ended exploration of possibilities to strengthen e-waste, ensuring proposals are not undermining the goal of further market development and keeping consumer prices affordable.</li> <li>• More clarity could be provided on the three different RBFs throughout the doc: <ul style="list-style-type: none"> <li>• one that focuses on the top 20% importers and wholesalers for SHS</li> <li>• one that focuses on the importation of productive use</li> <li>• one that focuses on incentivizing maintenance and consumer service (this one seems to be somehow delinked from the first two)</li> </ul> </li> </ul>



- The document mentions that under the FSD component financial support and loans will be leveraged. Is EnDev considering offering additional financing?
- Last time we spoke to EnDev, an end user subsidy for off-grid solar was considered – was this dropped?
- The document states that there is a budget document attached, which we have not seen.

**Clean cooking:**

- 1) Promoting tier-4 or 5 clean cookstoves: The proposal has highlighted a focus on electric cooking in the new phase of the program. It would also be good to see if EnDev is planning to promote other high-tier cookstoves that involve fuel switching, such as LPG, biogas etc. Along with other challenges, customer affordability and demand generation/aggregation are two key areas to be tackled in market development for higher-tier stoves. It'd be good to see more details of EnDev's plan to address these two issues in promoting, i.e. electric cooking.
- 2) Importance of establishing enabling environment for market development: this includes upstream efforts to support the government in establishing stove testing standards and approval procedure, setting up testing centers and technology screening criteria etc. This should be an important aspect of TA support.
- 3) Access to finance: innovative new financing schemes must be created to provide access to finance for consumers. End-users are usually individual households or small farmers, who lack of credit records and cannot access credits offered by either local financing institutions or suppliers. Partial guarantee provided by larger banks or investors could potentially play a role to provide some level of comforts for local financing institutions to lower the thresholds and on-lend to end-users.
- 4) Role of RBF: it'd be good to see more details about the RBF scheme under the EnDev program. WB is providing carbon BRF for National Biogas Program in Ethiopia and we are also testing the broader RBF scheme concept in other countries that provide incentives across the whole

		<p>supply chain from inventory to sales to impact. Our experience in Ethiopia shows that RBF could play a crucial role to incentivize suppliers to provide after-sale and in-time maintenance service which consequently optimizes the performance of the clean cookstoves. Success in China's national biogas program has shown the effectiveness of expanding technical support and biogas service system based on existing local agricultural technical network. WB implemented an eco-farming project that was completed in 2015. The project was also first of the kind in accessing carbon finance among biogas projects under Kyoto protocol. One of the successful lessons learnt from the project is to strengthen and expand the existing rural energy and agricultural extension services to improve the technical support systems for operation and maintenance of the biogas systems and facilitate integration of the existing rural energy and agriculture support services in the project province. It is also important to integrate RBF into the whole program design, and a threshold of performance rate can be set as one of the RBF payments triggers to incentivize robust and timely maintenance service to end-users. And the program should create a mechanism to encourage demonstration of various innovative models for providing biogas services</p>
Kenya	<p><b>Finale feedback on business case by consultants</b></p> <p>a) <b>Broad strokes at country level</b> Energy Access for Vulnerable Groups: Activities under this initiative, especially reference to general technical assistance for market development, are still fairly under developed; however great to see that the linkages to the previous cash transfer program have been incorporated into the proposal and that the implementation partner from the solar program will be an implementation partner for the Endeav rollout.</p> <p>b) <b>Portfolio level</b> For RBF programs, would be good to always have a clear sense whether up front financing is available to companies participating in the RBF, any linkages to the pre-financiers, and how that challenge will be resolved in markets where pre-financing will be a challenge.</p>	<p><b>Clean Cooking Alliance</b></p> <p><b>Clean Cooking Association of Kenya</b> CCA is also supporting CCAK to strengthen its lobbying efforts so we will be happy to continue to coordinate on our support.</p> <p><b>Solar for productive use</b> Recognizing that that the work that is planned to help "capacitate private sector to lobby for predictable government policies, regulation and legal environment, particularly with regards to fiscal policies/laws and quality assurance" is targeted at solar products, we are already coordinating with that sector as well, namely through CCAK, on similar efforts, so would be happy to coordinate with EnDev as well when it makes sense.</p>

	<p>This is especially important where RBF is targeting smaller companies and pushing them toward market segments with lower ability to pay</p>	<p><b>Awareness creation and targeted behavior change campaigns for ICS for Social Institutions &amp; Productive Use</b>  while we are not planning any campaigns, we would be happy to share our experiences and coordinate if there is work that also targets the household market.</p> <p><b>E-Cooking pilot</b>  we have a few companies in our Venture Catalyst portfolio who are entering the EPC market, so would be great to coordinate on that support where there are overlaps</p> <p><b>Standards and labeling</b>  CCA will be happy to continue to coordinate on efforts to support implementation of standards and labeling programs</p> <p><b>Gender</b>  Great to see that each project has undergone a gender analysis and will include specific provisions to ensure gender is mainstreamed throughout the project. CCA is happy to continue to coordinate on mutual lessons learned from integrating gender into clean cooking initiatives</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>The team has considered and incorporated comments, as relevant, and where they haven't, they have provided a clear justification for why not.</p>	<p><b>World Bank/ ESMAP</b></p> <p>WB team would like to provide some comments that consider the synergies of this work program with KOSAP, and contextual knowledge:</p> <ul style="list-style-type: none"> <li>• The plan to support the cookstove companies with knowledge and in formalisation of their operations is a welcome one, as many local companies have not been able to successfully bid for KOSAP funds due to capacity gaps. Some reasons for disqualification were totally avoidable, such as missing of deadlines and providing incomplete information. Therefore, in addition to technical knowledge on improving stove designs they could also consider developing their business skills on aspects such as preparing funding bids, keeping proper sales records etc. This would put them in a strong position to bid for future KOSAP (and other) calls and to pass the due diligence tests.</li> </ul>

		<ul style="list-style-type: none"> <li>• As KOSAP has no specific activities for refugees, it is good to know that ENDEV has specific activities in these communities.</li> <li>• The plan to create linkages between the formal companies and skilled service providers is also a good one for ensuring long term sustainability.</li> <li>• EPCs – The document is clear on the supply side measures but they could consider being on the demand side as well. There were serious safety concerns with the old generation pressure cookers which many people still recall, and this fear may deter adoption of newer ones despite safety improvements. Education therefore needs to be a key component. Being very explicit on the type of awareness to be done for specific technologies (beyond what is broadly outlined as behaviour change education) can help them to ensure such unique concerns are not missed.</li> <li>• A final recommendation is to identify opportunities for bundling some of these products and promotion efforts, as currently they are presented separately. For instance, while promoting institutional cookstoves in a school can one also do cluster marketing with teachers for instance? Can solar providers include cookstoves in their bundles? Can there be joint efforts with those promoting clean water services in the same schools? It's an approach that has been demonstrated to work well with non-cookstove products.</li> <li>• Additionally, there could be a heavy overlap with KOSAP and therefore the need to work closely with MoE team and SNV/Sunfunder, who are managing this process. The Kenyan Government has been adamant on the need to close refugee camps in Kenya (Kakuma and Daadab specifically), including a directive last week to close and relocate refugees. This could impact of their operations. KOSAP is targeting the host communities of refugees and we see overlap as well.</li> </ul>
Liberia with Sierra Leone and Guinea	<p><b>Finale feedback on business case by consultants</b></p> <p>Many thanks to the EnDev teams for their fine tuning of the proposal, which takes into account the comments on streamlining and clarifying the initial proposal across all three markets and provides much more detail on the proposed activities.</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>

	<p><b>Finale feedback on gender by consultants</b></p> <p>The revised proposal for Liberia/Guinea/Sierra Leone has according to the response matrix added % targets for training and clarified the target group and measures planned. Targeted measures are included to promote success of female entrepreneurs. Many activities are described in Ch10 to support female RE professionals, make women more visible in structures, addressing women's needs in RE services, and integrating gender in all EnDev activities. The 'EnDev Gender Strategy' in Ch 10 is not in fact attached however, and quantitative measurement of outcomes/outputs is still scarce in the revised proposal. E.g. the Summary sex-disaggregates targets for training but not for MSMEs. It is not clear what specific improvements are being measured in the cooking impact/outcome "the role of women in these significantly improved." I could not find the claimed % m/w targets for training, although reporting is planned annually on m/w participation in trainings and meetings.</p>	<p><b>World Bank/ ESMAP</b></p> <p>Sierra Leone WB team is currently preparing a cooking sector assessment to support the preparation of a clean cooking component under the Enhancing Sierra Leone Energy Access Project. WB team is also involved in the Mano River Union energy planning dialogue on the clean cooking side. With the Multi-Tier Framework (MTF) survey rolled out in Sierra Leone, it would be great for the WB and EnDev teams, in collaboration with other development partners, to facilitate data and information collection and sharing, further assess the synergies on the ground, and explore collaboration opportunities moving forward.</p>
Madagascar	<p><b>Finale feedback on business case by consultants</b></p> <p>No additional comments</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>The proposal includes additional details as requested. Madagascar already have a very large proportion of women in stove sales as well as management of the sales centres, which is very good. The team includes some new actions such as monitoring of social outcomes disaggregated by gender as of 2021 and segregating by sex the reporting on activities on all awareness campaigns from 2021 onwards. A clear gender disaggregation of targets for PUE is provided. In 2021, the team plans to develop a gender plan, appoint a gender representative (in Switzerland and Madagascar), including description of tasks and necessary resources (time and finances), which will further streamline the activities.</p>	<p><b>World Bank/ ESMAP</b></p> <p>No comments</p>
Malawi	<p><b>Finale feedback on business case by consultants</b></p> <p>No additional comments</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>The revised proposal for Malawi has many advanced activities and achievements for gender, as noted in the original comments. Though not intentional, most of the employment in the ICS component is female. Targets for technical training for women and for 50% of</p>	<p><b>World Bank/ ESMAP</b></p> <p>No comments</p>

	<p>reached fish processors and women in street food business are specified. Other gender results have been clarified. Participation by both women and men is encouraged and targeted. No separate GA is provided, though this is referred to.</p>	
Mali	<p><b>Finale feedback on business case by consultants</b></p> <p>Many thanks to the Mali EnDev team for the thorough and genuine answers to our comments. Much appreciated.</p> <p>a) <b>Broad strokes at country level</b></p> <ul style="list-style-type: none"> <li>Quality of proposal: We want to applaud the team for doing an excellent work for improving the quality of the final proposal.</li> <li>The section 2 Introduction – Historic Development is very valuable and helpful for the external reader to put proposed activities into context. Suggest that it becomes a standard section for every proposal.</li> </ul> <p>b) <b>Portfolio level</b> No additional comments.</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>The revised proposal for Mali seriously addresses the comments above. Energy for productive uses targets are specified with 38% led by women (although 50% is mentioned in Ch7??). In the response matrix, the team responds “thanks, other comments show we need to do a lot more, yet we are indeed doing our best. Real strategy upcoming, based on GA, national strategy, context analysis”. This shows that even in a gender-experienced and committed country program, there may be need for support and additional resources for gender, as well as perhaps a timeline that allows for earlier integration of the gender work in planning the next phase.</p> <p>The team also raises the question of their preference for integration of activities in regular budget lines rather than separate allocation. This is a broader question for EnDev to consider, how to make the allocation to gender clear and accountable while also integrating across activities. Adoption of a Gender Action Plan by country programs could accomplish this, including budget and timeline.</p>	<p><b>World Bank/ ESMAP</b></p> <p>The program complements some of the work that we are currently undertaking under the Mali Rural Electrification Hybrid System project (SHER), closing in a few months, which supports the hybridization of 45 mini-grids and the promotion of EE equipment in rural areas. The proposal questions the viability of this operation with statements such as <i>“Know-how of solar/hybrid operation increases yet sustainable operation is still to be proved – financial management of diesel powered mini grids has been challenging and hybrids require even more (middle/longterm) planning with pressure to reduce tariffs applied. EnDev considers this an important risk”</i> or <i>“Installations are popular while operation is not; bankable business-plans are lacking.”</i> No comment.</p> <p>We had mixed results on the promotion and distribution of Lighting-Africa certified solar lanterns, despite the subsidies provided to distributors and the associated information and awareness raising campaigns. It is encouraging to see that the activities envisaged in the proposal will strengthen these efforts, though it is not clear whether the pico-PV equipment and solar</p>

		<p>lanterns that the EnDev partners will promote will be Lighting Africa-certified or will follow a different certification standard.</p> <p>I particularly welcome the introduction of activities that aim to stimulate the equipment recycling and the clean cooking market segments, as they are not sufficiently addressed in our current engagement. These are potentially areas that we could further explore as we prepare the next energy access operation in Mali.</p>
Mozambique	<b>Finale feedback on business case by consultants</b>	<b>Clean Cooking Alliance</b>
	No additional comments	No comments
	<b>Finale feedback on gender by consultants</b>	<b>World Bank/ ESMAP</b>
	<p>The proposal makes several additions to the text and provides additional information and clarifications that was suggested as comments. Targeting of women SMEs included. Some specific are planned to be included as part of gender action plan, which are not reflected here.</p> <p>It is not clear if budget is allocated for additional activities that would be required to be undertaken when working with men, such as additional activities when working with women entrepreneurs (leadership development, basic ICT training, follow up coaching, assistance in starting businesses, basic financial literacy etc.</p> <p>The team does not seem to be convinced of the comment on “Please include an indicator on women headed households in access to various technologies “, which is up to their judgment and decision. However, it is to be noted that 36% of the children in Mozambique live in a single-parent household, most often headed by single mothers.</p>	<p>The EnDev proposal is covers market development, access to finance, community engagement and development of standards and testing. WB is beginning a new engagement with the Government of Mozambique on clean cooking and welcomes to opportunity to coordinate efforts in the sector. The World Bank efforts will be across the sector to support the enabling environment and market development across all stove technologies and fuels. Complementary initiatives such as the Energy Sector Working Group, the data platform under the FRASER Fund, the work on standards and testing provide scope for further collaboration and engagement. We recognize the importance of the work on gender aspects, TA for the market players and on standards and testing and see these as opportunities for synergies in up-coming WB engagement.</p>
Nepal	<b>Finale feedback on business case by consultants</b>	<b>Clean Cooking Alliance</b>
	<p>Many thanks to the Nepal EnDev team for the detailed answers to our comments. Much appreciated. However, comparing the previous with the final proposal, we are wondering whether modifications have been carried out by the team in order to reflect comments?</p>	<p><b>General Feedback</b></p> <ul style="list-style-type: none"> <li>The proposal provides a strong case for support electrification in rural areas of Nepal with clear targets. With the addition of activities on e-cooking, how is the team thinking of supporting electrification infrastructure which is also suitable for e-cooking? How is the team thinking of utilizing the stakeholders involved in electricity supply to also support with increasing its use esp. through electric</li> </ul>



cooking? It would be nice to see how the two efforts on electrification and e-cooking can complement each other.

- There is a large effort on electric network extension, will EnDev be ensuring reliable energy source infrastructure and ensuring the demand is met in addition to working with other organizations specifically working on reliability issue? Our recently published Demonstration Project, Nepal report highlights key requirements in the electricity infrastructure to support electric cooking. We will be happy to share our learning that we have gathered in regard to introduction of electric cooking from supply and demand aspect for Nepal based on our past and ongoing efforts.

#### **Theory of Change**

- In the theory of change for ICS, it talks about providing consumers with increased choices. It would be nice to see further clarification on how this will be achieved later on the plan.
- In the theory of change for electric cooking, has the team thought about who would be the likely consumers to focus in the early phase of transition? CCA's past and current efforts in Nepal to look into characteristics of early adopters related to electric cooking.

#### **Collaboration**

- With the new federal structuring and the local government having new roles and responsibilities. How is EnDev looking into building the capacity of local government stakeholders? Has there been any plans to share the "lessons learned" to other areas in Nepal to support with the clean cooking acceleration?
- In 2021, CCA will be completing development of a strategic and evidence based Country Action Plan to support the Government of Nepal to accelerate the scale up of clean cooking throughout the country. Ensuring coordination would help to ensure removal of duplication, efficient use of resources, and leveraging each other's strengths and efforts in Nepal.

		<ul style="list-style-type: none"> <li>• To support the Country Action Plan we are also building the Clean Cooking Explorer (CCE), an online, open-source, and interactive geospatial data platform focused on clean cooking, which was recently announced (<a href="#">link</a>).</li> </ul> <p><b>E-cooking implementer base</b></p> <ul style="list-style-type: none"> <li>• Will the team also focus on update of household electric wiring? Currently, many households do have the wiring to support electric cooking. Please note that CCA is completing a study soon on assessing the complete electricity supply infrastructure and looking into it from the viewpoint of its ability to support electric cooking. Also, the previous work by CCA on the Demonstration Project in Nepal has key recommendations on the supply aspects.</li> <li>• CCA has ongoing study looking to defining the early adopters of electric cooking, looking into oportunities and barriers to support demand enhancement through our work on consumer assessment for electric cooking. Also, our past work on Demonstration Project in Nepal provides various innovative and tested methods for increasing awariness and supporting with demand aspect for electric cooking.</li> <li>• Would like to see more on the GCF support for testing. What else is it supporting and how will it complement with EnDev's effort?</li> <li>• Please note that CCA has been involved in developing electric cooking standards and implementation strategy in close collaboration with the government. We will be updating these standards and implementation strategy in the near future. This would be key in developing list of quality e-cookstoves for Nepal. CCA will be happy to share these outputs.</li> <li>• The document early on talks about the need to support communities in regard to providing with maintenance of the electric appliance. This is an important aspect to ensure usage of electric cooking in Nepal.</li> <li>• Using the current CREE and NECAUN to support e-cooking efforts would allow to leverage the local network.</li> </ul>
	Finale feedback on gender by consultants	World Bank/ ESMAP

	<p>Sex disaggregated targets were already included in the previous draft, which is very good.</p> <p>A number of comments were made. Some of these suggestions have been recorded in the proposal evaluation matrix, but not included in the proposal yet, saying that these will be included as part of operational plan:</p> <ul style="list-style-type: none"> <li>• To include a section on Institutional Development at various level, including gender mainstreaming capacity of the CREE, since working with CREEs is a prominent element of the proposal.</li> <li>• Nepal has had a long history of GESI, so awareness at the highest levels is there already. What is less clear is how to operationalize at the local levels, especially within the new federal system. Hence, a full national level workshop on the topic may not be necessary. Better to demonstrate results and then share with relevant stakeholders (towards the end).</li> <li>• Look at women's involvement in the CREEs in decision making positions and how to strengthen that (workshops with policy makers are mentioned, but one on one engagement with the selected CREEs would be useful and perhaps this can be incentivized as well). In a concluded ADB project, Some CREEs set up a Women's Development Funds to provide loans for WSMEs and those using electricity for productive purposes.</li> </ul> <p>It was also suggested to include the results of a recently completed study on the e-cooking market (including from a gender perspective) has been completed by Practical Action Consulting. It would be useful to highlight the key findings and utilizing that for the e-cooking strategy. This hasn't been included in the proposal, even though the team informs, in the evaluation matrix, that the strategy is guided by the findings.</p> <p>An area that still need attention are what linkages will be established with the ongoing ADB-ENERGIA programme which is also focusing on PUE.</p>	<p>The EnDev program to focus on both ICS development e-cooking is important especially given the Government of Nepal's targets on clean cooking access and expansion. The WB welcomes the RBF pilot, market and supply chain development, gender aspects and user acceptability components of the project. There are synergies for coordination and complementarity as the WB plans its activities in the sector in Nepal. We welcome continued engagement on clean cooking in Nepal.</p>
Rwanda	<p><b>Finale feedback on business case by consultants</b></p> <p>The proposal has gone through significant change, but the updated objectives and approaches are very clear</p>	<p><b>Clean Cooking Alliance</b></p> <p><b>Support for companies</b></p>

		<p>CCA will coordinate on companies within its VC portfolio that are currently operating in Rwanda (currently Biomasssters and BBOX) and those interested in entering the Rwandan market.</p> <p><b>Standards and labeling</b> CCA will be happy to continue to coordinate on efforts to support implementation of standards and labeling programs</p> <p><b>Gender</b> Great to see that each project has undergone a gender analysis and will include specific provisions to ensure gender is mainstreamed throughout the project. CCA is happy to continue to coordinate on mutual lessons learned from integrating gender into clean cooking initiatives</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>The revised proposal for Rwanda includes 1/3 female-owned target for BDS to MSMEs. Many of the comments above still pertain however, since according to the response matrix, the gender analysis is still not yet available: “Background: the same consultants is also engaged for EnDev global level and it was decided to priorities this over EnDev RW.”</p>	<p><b>World Bank/ ESMAP</b></p> <p>The EnDev program is complementary to the recently established clean cooking operation under Rwanda Energy Access and Quality Improvement Project (EAQIP) funded by the World Bank. The EAQIP project has established a \$17 million RBF and supports the enabling environment. There is on-going collaboration and periodic consultations between EnDev and the World Bank along with other development partners. We welcome this engagement to ensure that the sector in Rwanda is aligned with the Government of Rwanda’s Biomass Energy Strategy and targets for achieving access to clean cooking by 2030.</p>
Senegal	<p><b>Finale feedback on business case by consultants</b></p> <p>Many thanks to the Senegal EnDev team for the detailed answers to our comments. Much appreciated. No more additional comments. Thanks</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>The project has a strong focus on gender, with clearly defined activities on working with women. The major issue of number of groups has been clarified. Collaboration with Energy4Impact has been included as well. Gender disaggregated targets have been included, as suggested:</p> <ul style="list-style-type: none"> <li>At least 50 women groups will become retailers of PV systems in collaboration with PayGo companies;</li> </ul>	<p><b>World Bank/ ESMAP</b></p> <p>No comments</p>

	<ul style="list-style-type: none"> <li>At least 40% of the electrified SMEs shall be run by women or employ mostly women</li> </ul>	
Tanzania	<p><b>Finale feedback on business case by consultants</b></p> <p>Many thanks to the Tanzania EnDev team for the detailed answers to our comments. Much appreciated.</p> <p>a) <b>Broad strokes at country level</b> Quality of proposal: We want to applaud the team for doing an excellent work for improving the quality of the final proposal.</p> <p>b) <b>Portfolio level</b> No additional comments.</p>	<p><b>Clean Cooking Alliance</b></p> <p>No comments</p>
	<p><b>Finale feedback on gender by consultants</b></p> <p>No comments</p>	<p><b>World Bank/ ESMAP</b></p> <p>WB suggests that the EnDev team align their support with the Rural Energy Masterplan currently being developed by REA, which has a section on clean cooking.</p>
	<p><b>Finale feedback on business case by consultants</b></p> <p>a) <b>Broad strokes at country level</b> As mentioned in the initial comments, the RBF scheme still seems incredibly ambitious.</p> <p>b) <b>Portfolio level</b> No additional comments</p>	<p><b>Clean Cooking Alliance</b></p> <p><b>UNACC Support</b> CCA will be happy to continue to share our learnings from supporting local alliances and coordinate as appropriate.</p> <p><b>Support for companies/E-cooking</b> CCA will coordinate on companies within its VC portfolio that are currently operating in Uganda (currently Lifeline Fund, Biolite, Mwangaza Light) and those interested in entering the Ugandan market</p> <p><b>Standards and labeling</b> CCA will be happy to continue to coordinate on efforts to support implementation of standards and labeling programs.</p> <p><b>Gender</b> Great to see that each project has undergone a gender analysis and will include specific provisions to ensure gender is mainstreamed throughout the project. CCA is happy to continue to coordinate on mutual lessons learned from integrating gender into clean cooking initiatives</p>
Uganda	<p><b>Finale feedback on gender by consultants</b></p>	<p><b>World Bank/ ESMAP</b></p>

The proposal has included additional information as requested, and it is good to see economic empowerment of women as part of the Theory of change.

Uganda is one of the four countries selected for country support from ENERGIA. The Uganda team proposes to develop a gender action plan. Sex- disaggregated targets are proposed to be included as part of the GAP to be developed, in particular on women owned distributors of solar and ICS (though the inclusion of women and youth in distributors is mentioned).

We note that the WB and EnDev approaches to clean cooking interventions in the coming few years are very similar as far as the Theory of Change and planned interventions are concerned. We should capitalize on this by coordinating and channelling the support in an integrated way. In this way, the combined firepower of the programs can help reach more HH and would avoid overlapping or competing on the same.

As you are aware, WB funded a 3 year RBF program (2017-2020) targeting distribution of highly efficient biomass stoves and will now be scaling this model up to continue on the same and further include other solutions such as electric cooking, LPG, biogas, ethanol, etc. The Clean Cooking Fund envelope for RBF grants in Uganda is \$10 million matched by at least another \$10 million IDA for working capital debt finance for clean cooking enterprises – both to be implemented by UECCC. This effort is targeting 353,000 HH (approx. 1.66 million people). Similarly, funding has been allocated for TA including business development support, empowerment of women entrepreneurs, innovation grants, and strengthening of monitoring of impacts esp. with regard to output and outcome based verifications.

In the past, we coordinated with GIZ by focusing our efforts on particular aspects of the value chain e.g. streamlining distribution, facilitating value chain partnerships, and financing for inventory, introducing highly efficiency industrially and semi-industrially produced stoves, etc. which were complementary to what GIZ was focusing on. We note that there are now ever-stronger similarities of the two programs albeit perhaps envisaged at a different scale given EnDev's indicator targets. Given that the focus seems to be shifting with the current EnDev program for 21-24, we should try to re-establish an understanding on where we focus our efforts and at what scale. We are happy to schedule a coordination call and share any program documents that would aid this discussion.

## 2. General feedback and observations on gender

Energia and the Clean Cooking Alliance provided general feedback and their observations with regard to gender. Both acknowledge EnDev's efforts and the strong emphasis in this programming cycle.

### 2.1 Energia

This overview note is based on a gender review of country proposals for EnDev 2021. It includes overall observations on the review of the country proposals, and suggestions on the way forward. The analysis is based on the proposals themselves, the feedback provided to proposals in 2019, the reviewers own understanding of the country and the sectors, and discussions during the "Pressure Cooker" sessions of 3-4 February. If required, the analysis can be further strengthened through a review of other relevant documents and discussions with country teams.

#### **Overall observations on the proposals**

There is significant improvement in the gender content of the proposals in this round. EnDev has placed increased emphasis on gender in this cycle, with a new EnDev impact indicator 5: Gender (Economic Empowerment) in the logframe. A more systematic approach to gender analysis using a practical/productive/strategic needs approach was recommended in the previous cycle, and this has been taken up by some countries in this cycle. Programming guidance from EnDev encourages the strategy to actively aim at gender equality and be gender transformative whenever applicable, not just gender aware. The country teams have

also learnt from the gender review carried out in 2019, and as a result, the proposals are much stronger on gender than in the previous cycle.

**A Gender Analysis (GA) Report** was mandatory for all country proposals in this round.

This was a major step forward. EnDev/GIZ provided detailed guidance to projects on preparation of the GA report. For this cycle, the analysis and GAP was prepared by a local consultant or staff based on desk review, interviews, and/or focus groups, and the GA report was presented to the project for incorporation. The GA reports follow a template, including GA of the country and sector, gender capacity of partners and the project, and a GAP table with specific actions. Gender analyses were undertaken during the same time period as the proposal was developed (except in Uganda, where the gender analysis was undertaken in 2017). We understand that a GIZ gender team is reviewing the gender analyses and checking that they are included in the country proposals, hence we were asked, due to time constraints, not to review the GA reports. Nonetheless, we felt it was important to take them into account in our proposal review and a quick review was done. Our overall impression is that the GA reports are of excellent quality and provide the evidence base and analysis necessary to identify needed and relevant activities. It should be noted however that only 12 of the 18 GA reports were available at the



time of our review, and given the parallel preparation, there may not have been sufficient time for even the available GAs to be fully incorporated into the proposals.

**There is variation in country projects in the extent to which women are seen as key actors and agents of energy supply, versus as beneficiaries. Some strengths of the proposals include:**

All country proposals have **intentionally focused on improving technologies and markets in subsectors that would be of especial benefit to women and where women participate at a high level.** Most do focus on economic empowerment of women, whether in production, sales and marketing, or productive uses, or time and labour saving. For example, Malawi ICS focuses on clay stoves, which are mainly produced by women, and fish processing PUEs, which are 80% women, as well as social institutions that benefit women and where women are cooks. The Senegal proposal too has a PUE component linked completely to fish processing, where large numbers of women operate.

In all countries, the **benefits accruing to women and children through use of ICS are recognized.** Further, women's employment in the improved cookstoves (ICS) value chains is generally good, e.g. 73% in Benin and 83% in Malawi. In Bangladesh, the partner's ICS maintenance programme 'Bondhu Chula Doctors' mainly targets women – 95% of its service providers are female. Exact nature of participation (for example, whether women are predominant in the low-paying, labour intensive parts of the value chain or in decision making roles) and the extent of leadership of groups is less evident from the documents, but still participation is significant.

Efforts have been made to **engage women in solar PV technologies and productive uses** as well. Training of women is a popular activity. A number of proposals target sectors for productive uses that have a high proportion of women employees, or of women-led businesses, in order to target benefits towards gender equality. Proposals vary however in the extent to which the assistance to productive uses and enterprises is gender-targeted, important since women have different constraints than men as entrepreneurs (eg mobility, child care, fewer assets).

In several cases (Bangladesh, for example), the **possible unintended negative impacts on women are foreseen and mitigation actions planned.** This may be strengthened, based on the GA reports. For example, one caution is that a common strategy in proposals is to focus on scaling up "successful" entrepreneurs who are high producers. This could result in excluding female entrepreneurs, who may lack capital and assets but have potential and may need additional support to scale up. The projects will need a graded support approach for the various categories of entrepreneurs. ENERGIA's women's empowerment programme has found several criteria important to selecting women energy entrepreneurs who will be successful: strong social networks, self-drive, access to mobility, and support from family members – with level of education and knowledge of energy technologies not deciding factors in success.

Virtually every proposal offers **good practices in gender programming**, which are noted in the overview to each proposal, including:

- Do No Harm analyses
- gender sensitive hiring practices

- strengthening female professionals and networks
- identifying needs together with female entrepreneurs
- cooperation with TVET institutions
- collaborating with gender-aware implementers and partners
- gender focal points
- emphasis on women's productive uses
- evaluating the impact of changing gender roles
- providing for women's child care, mobility and time constraints
- engaging with elected women
- leadership training as well as skills development
- making electric equipment more affordable through leasing
- training female technicians in order to change gender roles
- e-learning focusing on women
- changing perceptions of businesses of women's roles
- improving the enabling environment for women's participation
- working with local institutions on gender activities
- encouraging men's participation
- women's self-organisation
- affordability support through synergies with other implementer programs focusing on women

And so on. There is clearly considerable experience by EnDev projects in working on gender and widespread understanding of gender issues.

#### **Areas for further strengthening**

The most significant gap in the proposals is that most proposals do not include baseline and targets sex-disaggregated by gender, neither on outputs nor outcomes. As a minimum for the indicators in the overarching EnDev logframe which are gender-disaggregated, gender

disaggregated targets should be provided. There are good practices like Nepal, where the targets in each SME sub-sector are disaggregated. Training can also easily be sex-disaggregated. It is not clear if this is an oversight and planned to be developed by all proposals at a later stage or in the more detailed log frame.

Gender strategy section: In Ch. 6 Gender Strategy and Safeguards, the content varies across country proposals. Some list past work, some list planned activities, some provide a brief gender analysis of the country, some list the recommendations from the gender analysis and one refers to the GA report and GAP and adopts these wholesales. In many proposals, there is not really a gender strategy. In all proposals, the section includes a set of activities, however usually not a complete strategy. Ideally, the gender strategy should include a gender goal (what a project wants to achieve in terms of gender, articulated in a statement) that will produce the impact of improving gender equality or women's empowerment or any other. The strategy should be based on the current situation, lessons learned from the previous cycle, and challenges identified. A gender strategy should be about closing gaps, so first the gender gap needs to be identified. For example, if one goal is to improve gender equality in energy entrepreneurship and the m/f gap is 80/20, then a target might be to move to 70/30 or even 50/50. And a number of activities might follow from this, like leadership training, skills development, credit facility, enabling environment, childcare, support to women's groups, etc., according to the specific needs, to overcome barriers and make progress. The baseline allows setting a feasible target in the proposal, leading to a set of activities that make sense for that subsector and component, and a budget

item. The gender chapter should provide the strategy and summarise the gender actions that are spelled out in other sections.

Some projects do mention gender in other sections in some way, especially in the section on Social Development. Still, mostly, it is still not viewed as a central to economic development. Our impression is, for most countries, that there is **more scope for incorporating the findings and suggestions of the GA reports** into the various sections. We would like to see more emphasis on how achieving the goal of gender equality contributes to the project Results, for example how female energy entrepreneurship would contribute to meeting other targets.

In most cases, the **theories of change do not incorporate gender perspective** clearly. Many make general statements about benefits for women, but then the benefits are not documented, and actual numbers given are not sex disaggregated. Often, the mentions in the ToC do not link with the proposal activities.

Few of the proposals mention gender equality in the subsector as part of the **“Transformative Character”** chapter. At best, it is mentioned as part of social development. Even where women are being considered LMEs, their role is not included in the “Economic Development” section. It is not clear whether this is because gender equality is not perceived as a direct effect of the project, or whether this is simply an oversight.

**Budgets** are mostly not attached and those attached mostly do not disaggregate budget for gender activities or gender focal points; this may be important for accountability. Further, and especially in entrepreneurship development and productive use applications, women are

likely to need a range of inputs additional to men (leadership training, marketing, mentoring services etc.), which will need additional resources. It is not clear if these have been budgeted for.

**COVID-19 is generally not addressed** in the proposals, with exception of Malawi, where messaging with solar radios is supported. In conducting training, for example, countries may need to use digital means, and in doing so, the gender gap between men and women may prove to be a bottleneck in providing digital based services to women. A resource on gender, covid19, and energy is linked [here](#)

**Similarly, gender actions are not always systematically included** or anticipated in planning activities. For example, the shift from artisanal to semi-industrial production structures as well as the professionalization of distribution and after-sales services anticipated in Benin, could affect women’s ability to participate in this scale-up, despite women’s predominance at present in the informal production; specific support (and budget) may be needed to overcome women’s lack of access to capital, mobility, etc., and the often part-time nature of their participation in work. It would also be necessary to ensure that women-run businesses do not get taken over by men. While most projects are looking at women’s entrepreneurship and employment, the proposals do not always mention specific support needed to strengthen them. The attention to women farmers and adding value through water pumping and agricultural processing in some countries (e.g. Mali, Uganda) is welcome.

**Only a few projects discuss a gender perspective in humanitarian and conflict activities**, even though most refugees are women and children, and many have

gender relevance, e.g. ICS and street lights.

Some countries are already planning to **partner with women's organizations** and associations (Kenya, Cambodia and Laos, for example) which is good, however, there are several that do not mention this. Some (e.g. Mozambique Innovation Fund project) are looking into women's financial inclusion and risk, but others do not mention this.

Most proposals do not **link efforts to national gender policies**, or gender in national energy policies. The Kenya proposal, for example, does not mention the 2019 Gender in Energy Policy of the Ministry of Energy, which can potentially play a big policy role by demonstrating on the ground the provisions within the Policy. Malawi is an exception: ICS efforts are linked to outcomes stipulated in the 2015 Malawi National Gender Policy, the 1987 UN Committee on the Elimination of Discrimination Against Women (CEDAW) and the 2016-2020 Malawi Gender Equality Act Implementation Plan. Emphasis on gender in proposals by EnDev may be relative to government commitment and interest. For example, in Benin the project partners with a gender and development unit in the ME.

**Gender capacity and capacity building** needs of staff and partners are not consistently addressed. This is a major part of the GA reports analysis. Several countries have already engaged in capacity building on gender with staff and partners, and any needs could be identified.

In the ToC section on **Barriers**, most countries do not cite any gender-specific barriers. This does not correspond with the findings of the gender analyses that we have looked at. Barriers identified are the

basis for identifying interventions and activities.

### **Way forward/Feedback**

EnDev does not have a gender strategy but adheres to the GIZ gender strategy. EnDev has added a new Impact Indicator #5: Gender (Economic Empowerment), and the webinar explaining the GA process requests gender-responsive and/or gender-transformative actions. An overarching EnDev gender strategy would provide a framework to guide the partners' on how to incorporate gender in their proposals, as well as EnDev's gender goals/level of ambition to achieving gender objectives e.g. gender transformation, women's empowerment, welfare, project effectiveness. For example, in the proposal guidance documents, there are a number of conceptual notes on productive uses, BDS, social infrastructure, humanitarian, etc. - but no note on gender.

In our view, more could be done at country level to integrate the gender analysis into the proposal, before moving to international review. The parallel preparation of the GA reports may have made this difficult to achieve, and we would suggest that GA reports be prepared more in advance, and then GAPs and proposals can be prepared in parallel. Given that good gender analyses have been conducted, a step forward would be holding a GAP workshop to prepare the Gender Action Plan, i.e. a consultative process with staff and key partners, as a way to ensure ownership of the actions, as well as identifying the most innovative and feasible gender actions. Some countries (Kenya) are already planning the development of a separate Gender Action Plan. A local expert can present gender analysis of the country and sector and possible strategy, then staff responsible for different components can present the current situation of gender in

their component, achievements, challenges, and opportunities. An EnDev presentation on good practices in EnDev countries would add value. Drawing on these resources, working groups of the components could come up with a gender strategy and feasible actions to adopt. A separate session on gender capacity of partners and staff could be used to analyse the current situation and challenges and identify capacity building needs and activities. In this way, preparation of the GAP becomes a capacity building process in itself.

Attention is needed to sex-disaggregate overall results and outcome indicators. e.g. “no. of households” could be by MHH (male headed households)/FHH (female headed households); enterprises could be women- owned/men-owned, jobs could be disaggregated by type and sex; what kinds of jobs are being created for women and men, and are they part time or full time? Data on many of these metrics would be available already. At the most basic level, some possible indicators are:

- Enterprises created/improved – could disaggregate by women-led or women-owned vs men-owned
- No of people gaining access – could disaggregate by MHH/FHH
- No of productive uses gaining access – by women-led, male-led
- No. of social institutions gaining access – specify by type

Moving forward, it may be worthwhile to start thinking of and piloting the collection of some other gender-useful metrics that capture women’s empowerment but may be more difficult to collect. For example, measures of women’s empowerment as entrepreneurs and as consumers; appliances/end uses of electricity by m/w; changes in gender roles in cooking and

fuel procurement with new stoves and fuels; users of social infrastructure m/w. Other areas could include gendered impacts of energy appliances m/w (build on tier system for electricity); look at changes in gender roles in cooking or decisions about cooking investments, time, etc; changes in time use; empowerment; or use of social infrastructure; consider including water, grain mills in social infrastructure.

It would be useful to strengthen and standardise the content of Ch.6 Gender Strategy and Safeguards. The chapter could include, briefly, a summary of the GA, and use a practical/productive/strategic needs or gender-responsive/gender-transformative framework to explain the proposal gender strategy. It could also relate the strategy to GIZ gender strategies and perhaps the country gender strategy or even gender and energy strategy (Kenya and Nepal). Past experience, lessons learned, challenges, baselines and targets for the major gender results, outcomes and outputs could be summarized here. Further gender actions planned to be implemented within the team should be highlighted. Safeguards can be mentioned, eg avoiding GBV due to changes in gender relations.

A checklist for proposal preparation may also be useful. For example, is it expected that every country project will have a gender focal point or similar? Should budgets include a gender line item? Should gender capacity in staff and partners be specifically addressed? Which indicators should be sex-disaggregated and how? Should gender be included in every chapter?

Potential for learnings and sharing experiences and reviewing each other’s projects seems great, since some countries are “champions” or have experience with gender in components that others are just

starting, as well as in developing approaches and collecting gender-disaggregated data. Webinars on MS Teams seem to be regularly held on various topics, and perhaps there could be a series on gender programming experiences, challenges, good practices,

and opportunities in EnDev projects; and/or a good practice report with cases.

## **2.2 Clean Cooking Alliance**

Great to see that each project has undergone a gender analysis and will include specific provisions to ensure gender is mainstreamed throughout the project. CCA is happy to continue to coordinate on mutual lessons learned from integrating gender into clean cooking initiatives.

# Abbreviations

ADB	Asian Development Bank
ADELE	Access to Distributed Electricity and Lighting in Ethiopia (Worldbank)
ADES	Association pour le Développement de l'Energie Solaire Suisse
ANSER	Agence Nationale des Services Énergétiques en milieu Rural (National agency for rural energy services)
AVSI	Association of Volunteers in International Service
BBF	Bangladesh Bondhu Foundation
BCC	behaviour change campaigns
BCD	Bondu Chula Doctors
BDS	Business Development Support
BMZ	The German Federal Ministry for Economic Cooperation and Development
BREB	Bangladesh Rural Electrification Board
CCA	Clean Cooking Alliance
CCAK	Clean Cooking Alliance Kenya
CCE	clean cooking explorer
CEDAW	UN Committee on the Elimination of Discrimination Against Women
CLASP	Collaborative Labeling and Appliance Standard Program
CREE	community rural electrification entity
DEZA/ SDC	The Swiss Agency for Development and Cooperation
DGIS	The Netherlands Ministry of Foreign Affairs
DGIS	The Netherlands Ministry of Foreign Affairs
DKTI	German Climate Technology Initiative
DRC	Democratic Republic of the Congo
EAQIP	Rwanda Energy Access and Quality Improvement Project



ECCAA	Ethiopian Clean Cooking Alliance Association
EE	energy efficiency
EnDev	Energising Development programme
EPC	electric pressure cooker
ESMAP	Energy Sector Management Assistance Programme
FHH	female headed households
FSD	financial systems development
GA	gender analysis
GAP	gender action plan
GBV	gender-based violence
GCF	Green Climate Fund
GESI	Gender Equality and Social Inclusion
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
HEP	Household Energy Platform
HEP	Household Energy Platform
HIVOS	Humanistisch Instituut voor Ontwikkelingssamenwerking
ICS	improved cookstoves
ICS	Improved Cookstoves
ICT	Information and Communication Technology
IDCOL	Infrastructure Development Company Limited
ITAC	Independent Technical Advisory Committee
KOSAP	Kenya Off-grid Solar Access Programme
LPG	Liquefied Petroleum Gas
MFA-Norad	The Norwegian Agency for Development Cooperation
MHH	male headed households
MTF	Multi-tier framework
NACUEN	National Association of Community Electricity Users Nepa
NAP	National Action Plan (NAP) for Clean Cooking in Bangladesh 2020-2030
NIS	Nordic International Support Foundation
PA	Practical Action
PAYGO	Pay-As-You-Go
PUE	productive use of energy
RBF	Results-Based Financing
RE	renewable energy

REA	renewable energy agency
RVO	Rijksdienst voor Ondernemend Nederland
SFV	Smoke Free Village
SHER	the Mali Rural Electrification Hybrid System project
SHS	solar home systems
SME	small and medium sized enterprises
SNV	Netherlands Development Organisation
SREDA	Sustainable and Renewable Energy Development Authority
TA	technical assistance
ToC	Theory of Change
TVET	Technical and Educational Training
UECCC	Uganda Energy Credit Capitalization Company
VC	venture catalyst
WB	World Bank

**Funded by:**



Ministry of Foreign Affairs of the Netherlands



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**Swiss Agency for Development  
and Cooperation SDC**

**Coordinated and implemented by:**



Netherlands Enterprise Agency

**Published by:**

Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH  
Registered offices Bonn and Eschborn,  
Germany

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As of: July 01, 2021  
(final version)