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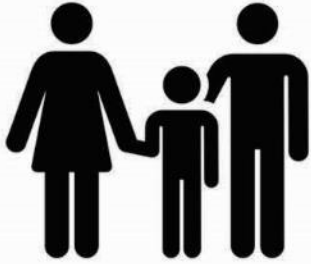
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Key Achievements since 2005



Energy access for
20.4 million
people accomplished

15.4 

million
household members
with improved
cooking solutions



5.0

million
household members
with electricity

Broader Impact

Indirectly, EnDev supported
– together with others –
access to sustainable
energy for at least

85
million people



2.1 million t of CO₂ saved per year – equivalent to planting of more than 5 billion trees

 **8.2**

million women, children and men with drastically reduced exposure to indoor air pollution

44,400

small and medium enterprises with a modern form of energy for productive uses



A total installed power with renewable energies of MW



62.6

20,540

social institutions with a modern form of energy: among them 12,458 schools and 1,264 health centres



40,500

trained technicians, stove producers, sales agents



A. EnDev in 2019

Access to sustainable and modern energy is a prerequisite for sustainable development and thus at the core of delivering on the goals of the Agenda 2030 as well as the Paris Agreement. Without progress on SDG7, it will not be possible to reduce poverty and foster economic development, improve public health, broaden the reach of education, or advance low carbon development. However, while meeting SDG7 remains within reach, current progress is too slow. To achieve access to affordable, reliable, sustainable and modern energy for all by 2030 concerted and intensified action is urgently needed.

- Today, roughly **1 billion people – or about 13% of the world’s population – still live without electricity.** Progress in the past years has been uneven and needs to become more widespread if the SDG7 goal of universal access to electricity is to be met by 2030. Otherwise, if current policies and population trends continue, as many as **674 million people** will continue to live without electricity in 2030.
- Also, still about **3 billion people – or more than 40 percent of the world’s population – do not have access to modern cooking technologies.** Progress has barely kept pace with population growth. To meet the goal of universal access by 2030, access expansion will need to accelerate. Otherwise, if the current trajectory continues, **2.3 billion people** will continue to use traditional cooking solutions in 2030, perpetuating much of the current negative health, gender, environmental, climate and development impacts.

Transitioning to universal energy access requires an extensive yet comprehensive set of political, technical, social, and financial changes – globally and on country level. Building markets for modern energy services is the prevailing paradigm, especially in the case of decentralized energy solutions. This requires substantially **higher levels of public and private investments** in the sector from what has been the case in recent years. To achieve SDG7, 1.0 to 1.2 trillion USD of investments annually are required until 2030 which would be a doubling of the global financing as compared to current investments. For universal electrification and access to clean cooking solutions 56.4 billion USD are annually required. Investments in decentralized solutions, essential to reach the poor in areas where the national grid will not reach, require “only” 23.0 billion USD per year which however need to be largely mobilized through investable and profitable business models that are only partially available now and for which innovation is highly needed. Reaching universal access also needs **scaled-up capacity building** – with renewed, cross-sectoral approaches, to develop human and institutional capacities in support of the energy transformation.

It is especially the building of local (and international) capacities in markets for energy access where EnDev adds value to the sector. EnDev supports the initiation and growth of pathways to universal access, while measuring its direct results as an indicator for success. By June 2018, EnDev sustainably **reached 20.4 million beneficiaries** with its 25 country projects in Latin America, sub-Saharan Africa and Asia. In addition, **20,540 social institutions** gained access to electricity or improved cooking systems and **44,400 small and medium enterprises** now have access to a modern form of energy for productive use. In the first half of 2018, EnDev facilitated sustainable access to modern energy services for additional **1,200,000** people. Thus, target achievement of the programme is on schedule.

A.1 EnDev strategy 2019-2022

EnDev’s strategic evaluative review

EnDev’s recent **strategic evaluative review** according to OECD DAC criteria demonstrates the programme’s high relevance by being very well aligned with the Agenda 2030 and the Paris Agreement. The review confirms EnDev’s outstanding position with regard to its geographic as well as thematic scope combined with a long-term track record in broad implementation of activities facilitating energy access to the poor. As the review notes, EnDev is renowned and appreciated for its flexible and pragmatic approach while delivering tangible results. Key cooperation partners such as *Sustainable*

Energy for All (SEforAll), World Bank's Energy Sector Management Assistance Program (WB/ESMAP) or the Global Alliance for Clean Cookstoves (GACC) confirm their strong interest in a continued close and strategically well-defined collaboration. The review concludes that EnDev is effectively managed and very good progress towards target achievement is proof for the programme's efficiency. EnDev's results are to a large extent sustainable and achieve significant impacts in a broad set of fields.

At the same time, the strategic evaluative review indicates a number of recommendations and strategic building blocks for improvement:

- **Contribute to transformational change:** EnDev should intensify – where appropriate – efforts for transformational change either with cooperation partners or based on own activities.
- **(Further) develop portfolio strategy:** EnDev is recommended to make a strategic re-orientation towards a stronger focus on poverty reduction through income-generation and local economic development, and translate this into its M&E system.
- **Specify entry and exit strategies more clearly:** EnDev should well define entry and exit strategies, also for multi-country activities.
- **Strengthen implementation structure:** EnDev should well define the selection processes of implementing partners and project proposals to guarantee fair competition, results-oriented selection, and flexibility for the management.
- **Structure knowledge management and innovation:** EnDev should take a strategic decision on the importance of knowledge management and assign a dedicated share of the budget. This allows to (even more) systematically analyze lessons learnt and dissemination.
- **Develop strategic outreach:** EnDev should develop an updated communication strategy and transfer it into an action plan to achieve strategic outreach.

EnDev's strategic orientation is fully in line with the political call for a stronger push towards progressing on SDG7 as formulated in the recent *High-level Political Forum on Sustainable Development* (HLPF) by making clean cooking solutions a priority and by harnessing the potential of decentralized renewable energy solutions. The strategic evaluative review's recommendations on strengthening EnDev's knowledge management and innovation agenda fits to the Forum's call to scale up capacity building, including sharing experience and data and promoting innovation.

Combining the findings of EnDev's strategic evaluative review with key results of the review of SDG7 provides strategic orientation for EnDev's future relevance:

- promotion of modern cooking and decentralized approaches as top priorities
- scaling up of capacity building and stronger institutionalization, including a strengthened approach towards sharing experience and data more pro-actively
- dramatic sector investment needs call for new and innovative partnerships with financial actors to mobilize investments
- crosslinking to the other SDGs, notably via productive use and economic development, but especially for gender

EnDev's strategy development

The development of EnDev's strategy for 2019-2022 is based on the aforementioned strategic evaluative review, an intensive exchange with core donors and implementers, and an in-depth portfolio review of all country projects. EnDev's strategy for 2019-2022 will guide the programme in terms of ambition, portfolio, governance, and management.

The strategic objective of EnDev is to contribute significantly to achieving universal access in the countries the programme is active in by driving energy sector transitions and by developing inclusive energy markets and sectors. EnDev is a key programme to deliver on the energy access agenda as well as to contribute to low carbon development paths of developing countries and to help them in meeting their climate targets.

Since its initiation, EnDev has become the internationally most renowned technical assistance programme to promote access to sustainable energy. Its results-orientation and strong commitment to achieve quantified global goals in combination with an on-ground technical expertise and performance-based approach makes EnDev unique. One of EnDev's strengths is being close to the needs of the beneficiaries with a bottom-up approach of building markets. EnDev pushes for a continuous increase of energy access levels to allow for poverty alleviation and economic development. While striving for attributable and measurable results on the ground, EnDev will more prominently and actively pursue opportunities for transformational change in the energy sector. Therefore, a key strategic element of the new phase of EnDev is to **expand the programme's transformational ambition**. As a consequence, EnDev's interventions in the enabling environment will intensify. EnDev will also need to engage more in **strategic partnerships for developing and implementing integrated approaches in support of energy transitions** on country level – including a stronger collaboration with key players for international advocacy as well as a stronger complementarity in working with the finance sector to bring markets to scale.

EnDev will further strengthen the **integrated partnership and collaboration of implementers by a shared knowledge management and innovation agenda**. Improving global learning transfer and promoting innovation requires a more prominent inclusion of core implementers as well as external players. EnDev will aim to stronger engage external (business driven) innovations into the programme, in particular rapidly developing digital solutions related to financing and consumer intelligence, and new applications of energy for productive use.

As a global programme and with differing sector conditions in each country, EnDev does not impose a uniform theory of change. Each individual country project has the possibility to select the intervention area (electrification – grid, mini-grid or stand-alone – or cooking energy) and the measures which are considered most promising and appropriate to overcome main blockages to provide modern energy services, thereby delivering on EnDev's impact areas. Country-specific intervention areas are, of course, also considered strategically from a portfolio development point of view – for instance, with a focus on the productive use of energy and (rural) economic growth. EnDev will remain to be technologically unbiased, promoting access to modern sustainable energy as the means for delivering on economic, environmental, and social impacts depending on the specific situation and the respective preconditions. This is the basis for every context-specific intervention logic in EnDev. In this process, EnDev country projects have the flexibility to adapt their approach and their activities continuously to changing conditions and according to lessons learnt.

However, this **flexibility is linked to a strong benchmarking which reflects EnDev's concept of managing for results**. EnDev country projects are and will remain to be subject to clear performance criteria and a comprehensive monitoring process, which are decisive for the projects' durations and the budget allocations. Success is measured in terms of:

- number of people, social institutions as well as micro, small and medium enterprises gaining sustainable access to modern energy services
- degree of sector transition and sustainable market development
- broader development impacts of the energy activities

In addition, country projects will be prioritized that contribute to the transformation of the sector towards an inclusive social, economic and low carbon development. This also includes activities to achieve access to modern energy on higher tier levels as well as energy access on municipal level based on renewable energies, and activities that strengthen the social participation of the poor through improved health care and education. EnDev will **push for higher tier levels** where this is opportune, especially to contribute to **rural economic development** through productive use of energy. Mini-grids as well as pure stand-alone solutions for productive use will be explored, as well as thermal energy for productive purposes. EnDev will nevertheless also fulfil its mandate to **leave no-one behind**, finding solutions serving the poor and vulnerable, including solutions that cannot be sustained by commercial markets alone.

The draft of EnDev's strategy for 2019-2022 is going to be discussed at EnDev's Governing Board Meeting in November 2018. Based on donors' feedback, the strategy will be finalized and approved at EnDev's next Governing Board Meeting, expected in May 2019.

A.2 Stepping up engagement with key partners and strengthening strategic alliances

EnDev management has embarked on developing a comprehensive partnership approach to increase EnDev's relevance and contribution to achieving the objectives of the Agenda 2030 and the climate agenda. One of the key recommendations given by the EnDev Evaluative Review conducted in 2018 is for EnDev to strengthen and expand its network of strategic partnerships and alliances with key stakeholders. The aim is to increase EnDev's visibility and contribution to energy sector transformation on country level, positioning EnDev in the international energy debate, and increase the visibility of EnDev donors' contributions.

In order to approach partnerships in a strategic manner, EnDev has identified four sectors to cluster relevant partners (1) policy sector, (2) private sector, (3) knowledge & research sector, and (4) finance sector. Partners are classified according to three levels of current cooperation level, followed by an assessment, if the cooperation should be intensified. These three levels of cooperation are:

- a) Key partner: Partners share a common goal and have an established collaboration on a specific topic / driving an agenda jointly.
- b) Primary partner: Partners work in the same field, have a common goal (complementarities) and/or are key actors in agenda setting, but no specific collaboration has been agreed upon.
- c) Secondary partner: Partners work in the same field with points of contact and cooperation case by case.

This approach to developing a partnership landscape has been presented to and discussed with the EnDev Governing Board in May 2018 and has been endorsed. EnDev has since worked on refining the approach and assessing the identified partners. Focus for 2018/2019 is to intensify cooperation with partners in the policy and finance sector. As a first step this will be done on global level and subsequently extended to the regional and national level.

Policy sector

Given EnDev's high relevance and contribution to the Agenda 2030 and the climate agenda, EnDev seeks to closer collaborate with key international partners on global level with the objective of joint agenda setting in the international debate. EnDev will contribute with its key feature of being "the voice of reality" with more than 10 years of implementation experience. Strategic partners are UN organizations and programmes, Public-Private-Partnerships (incl. "initiatives/movements") and international NGOs/networks.

A good example of a partnership in the policy sector is with the *Global Alliance for Clean Cookstoves* (GACC). In presence of the new GACC leadership, both teams met in 2018 at several occasions and agreed on a strengthened cooperation for the transformation of the clean cooking sector. The partners agreed among others to join hands in international advocacy and outreach activities as well as in increased cooperation in policy development support, including awareness and behavioural change campaigns. This agenda will be further sharpened and implemented in 2019.

Finance sector

Given EnDev's ambition to contribute to market transformation, EnDev will explore stronger collaborations with selected development banks. Next to these "usual suspects", particular focus will be on initiating stronger collaborations with small-/medium-scale finance organisations acting as intermediaries between commercial banks and/or investors and local companies. The focus is to increase market traction for dynamic local businesses by bridging the missing middle financing gap and by exploring new modalities.

A.3 International positioning and visibility

The EnDev team has been working on its more active role in the international energy debate and the SDG7 discussion in particular. EnDev staff actively participated in a selected number of international energy events in 2018. A few highlights:

Global SDG7 conference (Bangkok, 21-23 February 2018): At the high level panel on '*Achieving SDG7 in Asia and the Pacific*' EnDev stressed the importance of the 'Leave No One Behind' agreement in the energy access discussion.

SforAll Forum (Lisbon, 2-3 May 2018): In a panel debate on Health and Energy, EnDev addressed the poor sustainability of energised health centres.

Vienna Energy Forum (Vienna, 15-16 May 2018): In a panel on SDG7 review recommendation, EnDev advocated for increased attention of decentralized energy solutions and women's empowerment.

Alongside the SDG7 review at the **High Level Political Forum** (New York, 9-18 July 2018), EnDev published a series of five country project stories all of them directly related to SDG7 priority outcomes. In this way the importance of a) increased capacity building; b) the 'leave no one behind' agenda; c) local economic development; d) the benefits of clean cooking solutions and d) decentralized energy solutions, was demonstrated by real stories from EnDev's interventions. This campaign was discussed with EnDev's key partners SNV, Hivos and Practical Action beforehand, as part of its more strategic outreach in coordination with its partners. Social media traffic picked up these messages including representatives from key partners as well as core donors from The Netherlands, UK and Norway.

In early July 2018, EnDev brought together communication and advocacy experts from implementing partners SNV, Hivos and Practical Action as a first step to align outreach and communication activities and to make better use of each other's communication channels. The meeting resulted in an action agenda, which will be further developed in the course of 2019.

At the same time, EnDev started a re-branding trajectory aimed to align the EnDev brand to its new strategy, including a set of key messages. The update of EnDev's public image, including a new brand design, is expected to support an increase in visibility. This process takes place in parallel to the strategy development for the new phase. The re-branding is planned to be published in the first quarter of 2019.

A.4 Developments in promoting rural electrification and modern cooking

Rural electrification

EnDev's interventions in rural electrification are highly diversified: In remote or sparsely populated areas with no access to a central grid or even mini-grid, EnDev promotes mainly stand-alone solar photovoltaic systems (solar home systems, small solar home systems, pico solar kits, and solar lanterns). For remote areas with no access to a central grid and no plans to be connected to the grid in the near future, EnDev also supports decentralized or mini-grid energy solutions. In areas where a power grid is in close distance, EnDev also facilitates grid extension or densification.

Market dynamics and additionality

The market for certified stand-alone solar systems starts to show signs of stagnation for picoPV while the Pay-as-you-go (PAYGO)-based solar home system (SHS) market booms. After an initial period of explosive growth rates (170% between 2010 and 2012 and 97% between 2012 and 2014) reported sale figures have increased by "only" 9% between 2014 and 2016. For 2017, the number of systems sold remained constant at around 8 million with different dynamics in the market segments pico and plug-and-play SHS. The pico segment (< 11 Wp) of the market which is still responsible for 86% of total

cumulative sales to date has slowed down due to several factors listed below. At the same time, the market for SHS (>11+ Wp) has seen rapid growth rates with system sales growing from 75,000 units in 2014 to 378,000 units in 2017. Still responsible for only 5% of the market, this segment already accounts for 20-30% of annual revenues. This is largely enabled by PAYGO. PAYGO-based SHS companies are particularly successful in Asia with 86% of sales, followed by East Africa with 12%. The West African market is still relatively dormant with 2% of cumulative unit sales.¹²

Several reasons are responsible for the different trajectories in the stand-alone market. For picoPV, a saturation effect can be observed in major markets where sales are still concentrated around easy-to-reach urban and peri-urban areas. Furthermore, companies active are under pressure both by low-cost non-certified products and PAYGO products with higher capacities, following the overall trend towards systems with more functionalities. This is in stark contrast to the success story of PAYGO-based SHS. Besides the general customer tendency to demand for more appliances, companies offering PAYGO-based SHS were also less exposed to competition with non-certified products due to a range of market barriers (e.g. working capital, PAYGO integration, sophisticated customer relation management). The market grows particularly fast in regions with strong mobile money systems. A range of macro trends affected both market segments. On the one hand localized shocks in key markets led to decreases in sales. On the other hand the short-term introduction of import duties in the East African Community (EAC) resulted in significant volatility and concerns among companies in the region.³

EnDev supports companies working with several business models across the technology range. This includes cash sales of stand-alone products as well as PAYGO or fee-for-service. In the case of over-the-counter solar products, the intervention comprises mainly capacity development of entrepreneurs and awareness raising among customers. Activities include information and knowledge management, training, introduction of innovations, networking and awareness creation. In countries, where the market is in an advanced stage (e.g. Kenya), EnDev will focus its activities on rural undersupplied regions and market segments, on last mile entrepreneurs as well as on areas that supplement and enhance market development such as local assembling, warranty and repair systems, electronic/battery waste management and recycling. In the case of PAYGO systems, EnDev mainly provides results-based incentives and other forms of temporary subsidies for installing systems in remote areas and in poor households. Projects are advised to provide any financial support in a way that distortions of markets and a culture of dependency are avoided.

In light of the dynamic market development of stand-alone systems, intervention strategies in this area will be closely tracked to **assess EnDev's additionality**. There might remain a need for EnDev support even in highly dynamic markets, but maybe less in terms of fostering market-based access but rather in the field of regulation. In addition, with private households as a market segment for stand-alone systems being in a more advanced state of development in several countries, a stronger shift to the productive use of energy could potentially become a more relevant intervention area in selected countries and market segments. Declining prices for solar components and the introduction of more durable batteries increase the feasibility of stand-alone solar systems for productive use – going beyond the provision of basic services such as lighting, phone charging or powering TVs, towards devices which would previously require a grid connection or generator.

Market development is at different stages in EnDev's countries depending on technology and region and ever evolving, therefore, requiring context specific interventions.

¹ https://www.gogla.org/sites/default/files/resource_docs/gogla_sales-and-impact-reporth12017_def.pdf

² https://www.gogla.org/sites/default/files/resource_docs/gogla_sales-and-impact-reporth2-2017_def20180424_web_opt.pdf

³ https://www.gogla.org/sites/default/files/resource_docs/2018_mtr_full_report_low-res_2018.01.15_final.pdf

EnDev interventions for rural electrification

Stand-alone systems: In East Africa, EnDev observes market maturity for the pico segment in selected urban to semi-urban areas. Challenges shift to reaching the last-mile, improving customer relation management, minimising the risk of customers defaulting on PAYGO credits and standardisation. In West Africa, the market is dominated by cash-sales with limited mobile money infrastructure. However, this situation is changing with East African PAYGO SHS companies seeking market entry. There may be room for EnDev to support the market entry of PAYGO-based business models in selected markets, adding to the efforts of the IFC “Regional Off-Grid Electrification Project” (ROGEP). This could draw from the experiences gained in East Africa, Asia and Latin America.

Mini-grid approach: EnDev has been or actively supports the mini-grid sector in thirteen country projects (Ethiopia, Honduras/Nicaragua, Indonesia, Kenya, Liberia, Mali, Mongolia, Mozambique, Nepal, Rwanda, Senegal, and Uganda). Over the years, EnDev’s approach towards mini-grids evolved and can be roughly divided into two phases:

- In the **first phase** (2005-2009), EnDev started developing and realizing mini-grids in Honduras/ Nicaragua, Indonesia, Mongolia, Mozambique, Senegal, and Uganda. In the absence of an experienced private sector, EnDev collaborated with companies to jointly realize mini-grid projects. During this phase, EnDev’s role can be compared to a de-facto project developer with a focus on mini-hydropower as PV-based mini-grids were inferior in terms of technical reliability, costs, and market knowledge.
- In the **second phase** (2009-2014), EnDev developed and realized additional mini-grids and extended activities to also cover Ethiopia, Kenya, Mali, Nepal, and Rwanda. EnDev began to refine activities and – where possible – shifted to a supportive role for market development. This was possible in Nepal and Indonesia where EnDev’s interventions focused on quality assurance and productive use promotion. In other countries, EnDev had to spend a significant amount of time and effort to accompany the sites that EnDev had helped to develop but which did not operate sustainably due to a variety of reasons.

At least since 2014, mini-grid activities are under increased scrutiny, mainly due to their relatively limited cost-efficiency in terms of investment costs per household connection and difficulties in achieving sustainability but in terms of limited perspectives for commercial market development. Key challenges to sustainability arise from the regulatory framework (mainly licensing and tariff setting) related to a complex and lengthy policy reform process before favourable market conditions can develop. Within EnDev’s performance-based-approach, mini-grid markets outside of countries with favourable framework conditions are naturally the less preferred option when compared to e.g. stand-alone systems where tremendous progress towards autonomy could be observed. Where no grid connection is planned and foreseeable in the long term, mini-grids are the least-cost option for higher tier access in remote areas and allow for a wide range of productive uses including appliances that require three-phased power. At the same time, a range of companies with increasingly sophisticated business models is actively seeking a viable market to provide electricity services to rural communities. This is supported by a vibrant international sector expert community to which EnDev actively contributes, mainly by participating in the steering committee of the *Mini-grid Partnership* and the *Mini-grid Funders Group*. Both groups are instrumental in sharing best practice and knowledge in the sector, with participants ranging from donors (DFID, World Bank, AfDB, USAID, Shell Foundation, AFD) over sector associations such as the *African Mini-grid Developers Association*, *Alliance for Rural Electrification* or *Club-ER* to implementers such as SNV and Schneider Electric. In these discussions, EnDev provides valuable input based on its wealth of experience with more than 10 years and 920 mini-grids facilitated. Given the steadily increasing international financial support for the development of mini-grids, EnDev’s positioning and potential future role should be systematically assessed and re-strategized. EnDev can either play the role of a specialist supporting interventions of other stakeholders with tailored complementary activities (e.g. productive use promotion or operator incubation) or significantly impact the market trajectory in a small number of selected countries. The

latter role would require significant efforts– and, logically, fund allocations – to allow for significant contributions to sector transition.

Grid approach: The EnDev approach to national grid extension or densification is diverse. In the Latin American countries, EnDev focuses its activities mainly on capacity development of local technicians to improve quality and safety of indoor installations, and on punctual support, where extension programmes of utilities face bureaucratic problems. In Nepal, EnDev is co-financing grid extension in combination with community training and promotion of productive use. In Senegal, EnDev supports communities to afford grid access. In the context of country-specific programming starting as of 2019, previous experience in grid extension or densification activities will be analysed to assess EnDev's future role and continued involvement in this field.

Modern cooking

The mid-2018 High-level Political Forum on Sustainable Development – reviewing amongst others SDG7 – reconfirmed the need to intensify actions towards universal clean cooking by declaring it a top-priority on the development agenda. Business as usual is not leading to satisfying results. This also implies that EnDev needs to revisit its strategy, as is currently ongoing, to think more in terms of (and support) broad sector transitions, intensify and widen its cooperation with other main players in the sector, promote innovation and to not shy away from possible disruptive solutions that may move the sector forward.

In line with this thinking and taking an advance on EnDev's future strategy towards clean cooking, EnDev has progressed on a number of key tracks in 2018 which will be advanced into the next year(s).

Transition and partnerships

In 2018, EnDev has worked diligently on its proposal for the **Green Climate Fund**⁴ (GCF) for a comprehensive support of the clean cooking sectors in Kenya and in Senegal. In that process, together with key actors in the countries, a transition theory for the respective markets was developed. In Kenya, this was done in a close cooperation with the **World Bank** team, supported by **ESMAP**. EnDev's proposal for the GCF in Kenya is designed to be complementary to World Bank activities in the cooking sector under the Kenya-Offgrid Solar Access Project (KOSAP), aiming at attracting additional GCF funding. Uniquely, both teams coordinated their approaches to one complementary transition strategy for the Kenyan clean cooking market. The key differentiating points as well as the opportunities for an integration between World Bank and EnDev approaches in Kenya are as follows:

- **Outreach and target areas:** In combination, the World Bank and EnDev projects would cover all of Kenya's counties and thus the entire market, in one way or another.
- **Targeted stove enterprises:** Together, the two projects would address the challenges of the two main stove enterprise groups, enabling the local small and medium scale and large-scale manufacturing enterprises to serve their respective market segments and tap synergies for cross-fertilization in entrepreneurial and corporate development.
- **Engagement in the supply chain:** The product range in the supply chain and the choice for the consumer will grow, if both projects provide support at different stages in the supply chain, depending on the kind of business/product.
- **Modes of delivery:** Both institutions offer support packages to the different market players, focussing on their core competencies and experiences of technical assistance respectively financial assistance. While EnDev will be working with a results-based support approach via technical assistance, World Bank will focus on a results-based grant approach via financial assistance.

⁴ Concept note shared with the EnDev Governing Board at 14.09.2018.

EnDev's focus is on local production that can be more easily afforded by poorer population groups, and assisting them towards an investable level of operation. World Bank support goes to assisting more industrialized producers to expand their distribution into underprivileged regions. Efforts in the enabling environment will be addressed jointly, including a strong coordination with the Ministry of Energy as the lead ministry.

EnDev has strengthened its ties with the **Global Alliance for Clean Cook stoves** (GACC) which, after the change in leadership, is currently revisiting its own strategy. Several extensive discussions between GACC and EnDev have created a good opening for future cooperation on country and on international level, on the basis of shared views on how to transition the sector. It was agreed to further explore:

- joining hands in international advocacy and knowledge sharing activities, including international events
- jointly developing integrated approaches in support of transitioning the clean cooking sector
- increased cooperation in policy development support, including awareness and behavioural change campaigns
- better alignment of and cooperation within in-country activities, like strengthening national clean cooking alliances

The basis of understanding between the two organizations is the acknowledgement of the need for a broad and integrated approach that comprises all technical and financial solutions, including intermediary ones, while strongly pushing for innovation towards the best. In such an approach each organization has its role to play, but rather than making a separation over technologies the distinction should focus more on market (and company) development stages and supporting roles in the market and sector. Both organizations, whereas their foci may be different, have a role to play in all cooking tier levels and future strategies should express that.

In future, EnDev intends to further engage with key partners (GACC, ESMAP, GLPGP) in the clean cooking sector to shape this vision of an “integrated ICS/BLEENS⁵ approach” to support a comprehensive transition although it can be expected that market development will remain to be complex. The potential for integrated interventions will highly depend on the country-specific situations and respective levels of market development, but also needs to account for the different user segments and their needs, the stove stacking situation and a comprehensive understanding of the access to modern cooking situation along the lines of the ESMAP-MTF and the EnDev Cooking Energy System. Affordability and the willingness to pay higher prices for cooking systems are generally low among (energy) poor households. As a result, high quality cooking solutions with strong positive health and energy impacts (both ICS and BLEENS) are difficult to bring to the market if the price (stove and fuel) significantly exceeds current expenditures for traditional cooking systems. Emerging business models like PAYGO, incremental fuel sales, and combined fuel and tool models provide promising solutions but often still have to demonstrate scale. While striving for an integrated approach, it seems realistic that EnDev will implement a parallel strategy by supporting continuous improvements of locally produced stoves in the low price segment next to the introduction of technically more advanced cooking systems (including BLEENS) for households willing (and able) to pay an adequate price for the higher quality and service level and the support of innovative consumer financing solutions (and/or social safety nets) bringing these more advanced systems within reach of the poor.

Enabling environment

With earmarked funds of DGIS/RVO EnDev has worked intensively on strengthening the position and the capacity of national stakeholder organizations in 5 countries in which it operates; Bangladesh, Ethiopia, Ghana, Kenya and Uganda. These organizations are regarded as potential critical players in the cooking energy transitions in their respective countries. They either represent the private sector (and sometimes other stakeholders) in the national discussions or, in the case where governments are in the lead (Bangladesh, Ethiopia) have the opportunity to bring all stakeholders together into the

⁵ BLEENS = Biogas, LPG, Electricity, Ethanol, Natural gas and Solar; being considered as clean cooking fuels.

debate. Although they are not the natural partner to lead the discussion in their countries they have a (potentially) strong role in driving the sector forward. At the beginning of EnDev's intervention these **National Alliances** were found to be struggling, suffering from insufficient representation (low and narrow memberships), capacity (staff and experience), strategy (and focus), and institutional strength (finance, governance). With support of EnDev's Implementing Partners and RVO these Alliances over the last two years have developed business plans and strategies, have welcomed new members from different parts of the sector, have gained a strong position in their national sectors and the national debates on clean cooking and are, in some cases, considered as the voice and knowledge platform of the sector. They have been instrumental in e.g. obtaining VAT and tax exemptions for stoves and materials, for developing voluntary standards for producers, in the design and implementation of awareness and behavioural change campaigns, spurring innovation, and in the development of policies and regulations for clean cooking. Although progress in some countries is more advanced than in others, and the Alliances seem to develop slightly different roles and positions in their respective sectors, EnDev expects that further support will contribute to a stronger organization in the sector and positive impacts on the enabling environment.

As of 2018 the earmarked funds for this activity run out, after which it will find its way in EnDev's mainstream approach in close cooperation with the Global Alliance for Clean Cook stoves. This has been initially and positively discussed and will be firmed up in 2019.

Sharing experiences and contributing to the international debate

EnDev joined forces with ESMAP and WHO to further work on the **Multi Tier Framework (MTF) for modern cooking**. The different attributes of the MTF have been discussed and agreements were made regarding the major parameter of health. Further attributes will be aligned in the near future. The EnDev CES (Cooking Energy System) model is providing valuable practical experience to the discussion about attribute characteristics and tier levels. The MTF development (ESMAP) runs in parallel to the SDG 7.1.2. tracking (WHO), intends to bring more and deeper insights into the cooking energy environment of a household, but will not replace the SDG progress monitoring. Nevertheless the parties involved, ESMAP, WHO and EnDev see the discussions and alignments between both adding considerable value to the individual instruments that are both still in development (testing assumptions, proxies, evidence).

Liberia: solar-powered appliances in the health centre help the staff work during the evening

When people walk up to the health clinic of Careysburg after 6:30 p.m., they can see lights in the pitch black of the night, and know where to go. This has not always been the case. Together with Welt Hunger Hilfe (WHH) and We Care Solar, EnDev facilitated the installation of a solar system for the health clinic in 2018. The clinic there is the health provider to 34 surrounding villages, catering to about 300-500 people. The solar system powers in total 67 lamps and several other electric appliances. In the first month since the solar installation, the number of deliveries at night increased from one on average to 14. Using the bright LED lamps and the electric devices, examinations in the evenings and the care of emergencies at night can now be performed effectively.

Complementing the solar system, a water pump was provided by WHH. It ensures that the clinic staff can use water in which there are no mosquitos breeding. Additionally, EnDev provided the We Care Solar Suitcase®, which is a portable energy box that includes solar powered communication devices and lights as well as simple medical equipment that provides the basic work of rural health centres. The larger version of the case contains an ultrasound device that significantly improves the medical care of pregnant women and their unborn children.

Patience Flomo, mother of two, delivered her first child in 2014 at Careysburg health clinic, prior to the electric power, "I felt bad when delivering without light. I was afraid of mistakes, and of snakes when travelling to the clinic. In the clinic, we couldn't find water or instruments. We were using phone lights, which are not a sufficient light source."

Nurse Jullie T. Ballah (pictured) adds, "I feel fine and happy during deliveries at night, because now we have light which makes it possible to see the position of the baby."



B. Overview of current status of the EnDev programme

B.1 Outcomes in the period 2009 – June 2018 (EnDev 2)

This chapter provides information on energy access outcomes, health impacts and CO₂ emission reduction for phase 2 starting in 2009. Since the beginning of 2015, EnDev also reports on specific job creation, leverage and gender indicators.

By mid-2018, the EnDev partnership comprised 29 projects in 25 different countries, with side activities in additional 5 countries. EnDev supports access to improved cooking systems in 21 of the 29 projects, to off-grid solar technologies (solar home systems and picoPV) in 17, to mini-grids (solar/hybrid or hydropower) in 10 projects, grid extension in 11 projects and biogas in 5 projects (see table B.1).

Table B.1: Overview of technologies supported in EnDev projects in 2018

		stoves	biogas	other cooking/thermal	SHS	picoPV	solar mini-grid	hydro mini-grid	grid	other lighting/electricit
country projects	Bangladesh									
	Benin									
	Bolivia									
	Burkina Faso									
	Cambodia									
	Ethiopia									
	Ghana									
	Indonesia									
	Indonesia biogas									
	Kenya									
	Liberia (with Sierra Leone and Guinea)									
	Madagascar									
	Malawi									
	Mali									
	Mozambique									
	Nepal									
	Peru									
	Rwanda (with Burundi and DRC)									
	Senegal									
	Tanzania									
Uganda										
Vietnam										
multi-country projects	BD, KE, RW, TZ, UG ⁶									
	Central America (HN, NI) ⁷									
	Kenya, Tanzania, Uganda									
	Mekong (KH, LA, VT)									
	Sub-Saharan Africa (MOZ, UG)									
	Cooking sector support and									
	Refugee activities (KE, ML, SO,TZ,UG)									

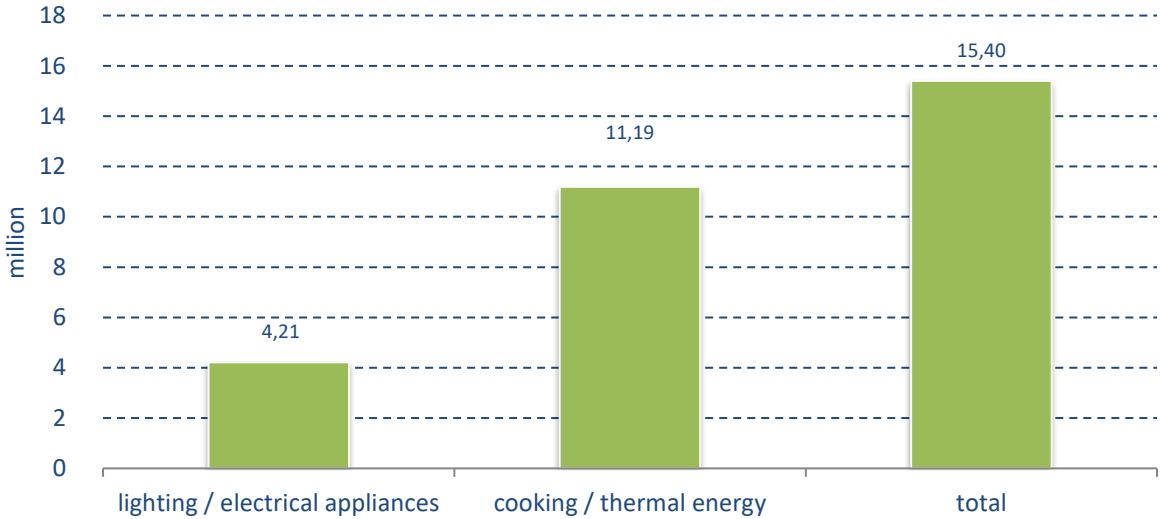
⁶ focus is on off-grid appliances.

⁷ with some activities in Guatemala.

Outcome figures

By June 2018, **EnDev 2** facilitated sustainable access to modern energy services and technologies for about **15.40 million people**. Of these, 4.21 million people (27%) were connected to the central grid or a mini-grid, or used standalone electric systems. 11.19 million (73%) are now using improved cooking technologies, such as improved firewood and charcoal stoves or biogas plants (figure B.1). In addition, **13,040 social institutions** gained access to electricity or improved cooking systems and **32,445 small and medium enterprises** now have access to a modern form of energy for productive use.

Figure B.1: Adjusted number of household members provided with modern energy services in a sustainable manner (EnDev 2)



The focus of the EnDev programme is on Sub-Saharan African countries. Around 62% of the committed EnDev 2 funds are currently allocated to this part of Africa (figure B.2). The share of least developed countries (LDC) supported by EnDev is 63% (figure B.3).

Figure B.2: Funding by region

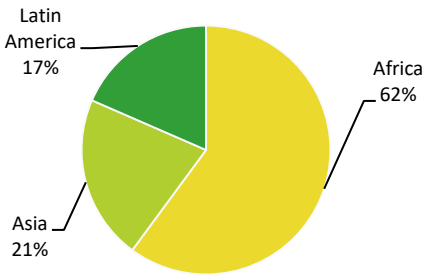
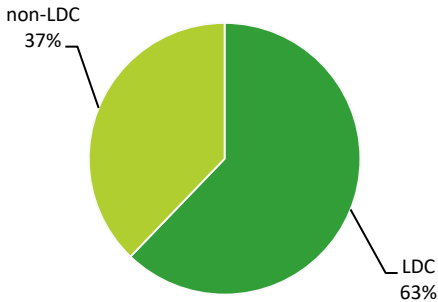


Figure B.3: Funding by countries



The majority of the target achievement on household level comes from access to modern cooking solutions (73%) while households with access to electricity contribute 27% to the overall target achievement (figure B.4). 41% of the country budgets are used for activities to promote modern cooking, 59% to promote access to electricity (figure B.5). Especially the sales of picoPV systems experienced the highest growth rate.

Figure B.4: Target achievement - People with access to energy - EnDev 2

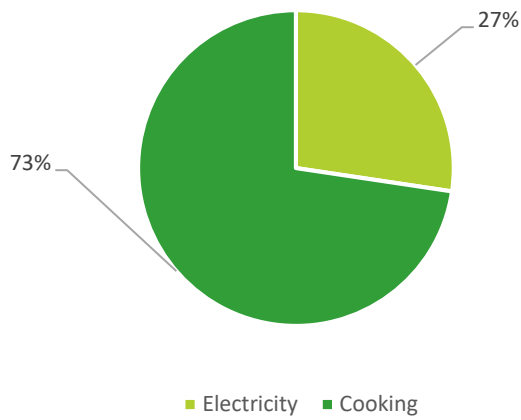
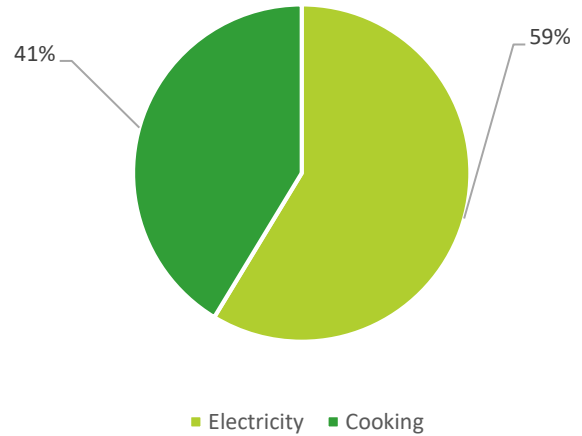
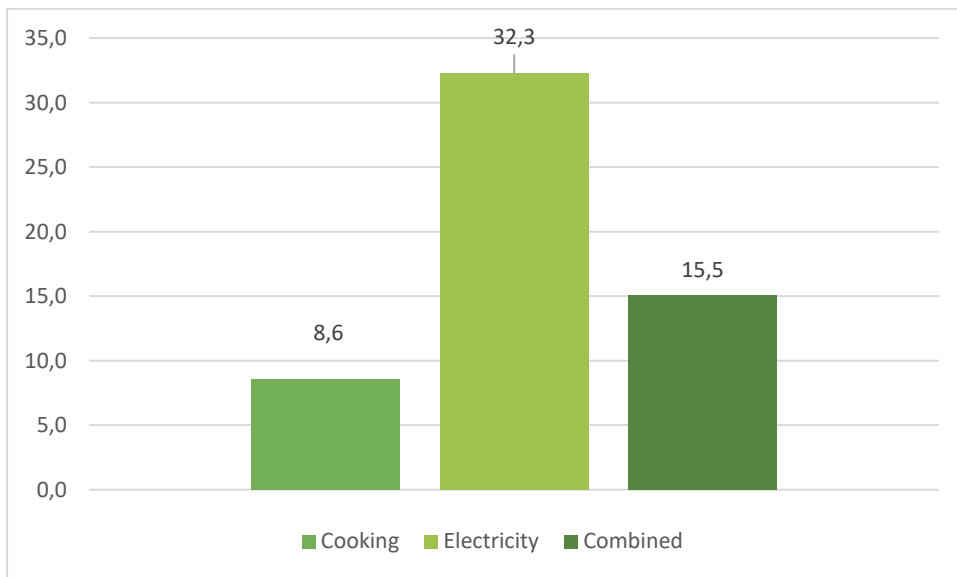


Figure B.5: Expenditure - EnDev 2

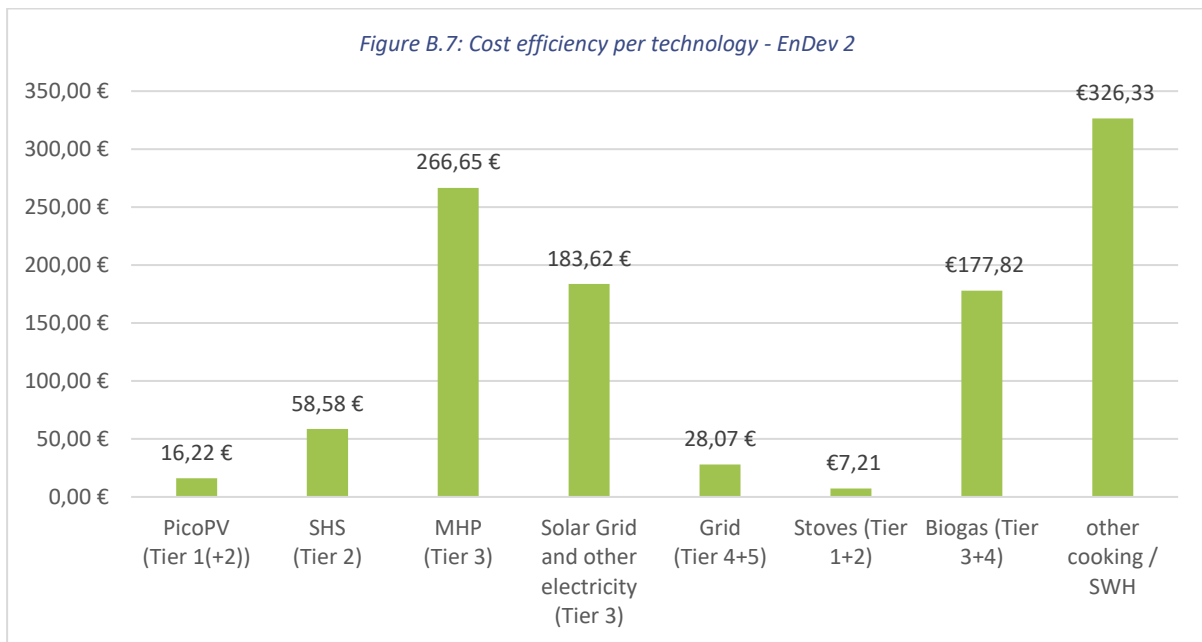


The cost efficiency of cooking technologies (stoves and biogas) is currently EUR 8.6 per person on average and EUR 32.3 per person in the case of electrification (figure B.6).

Figure B.6: Cost efficiency in EUR per person reached – EnDev 2

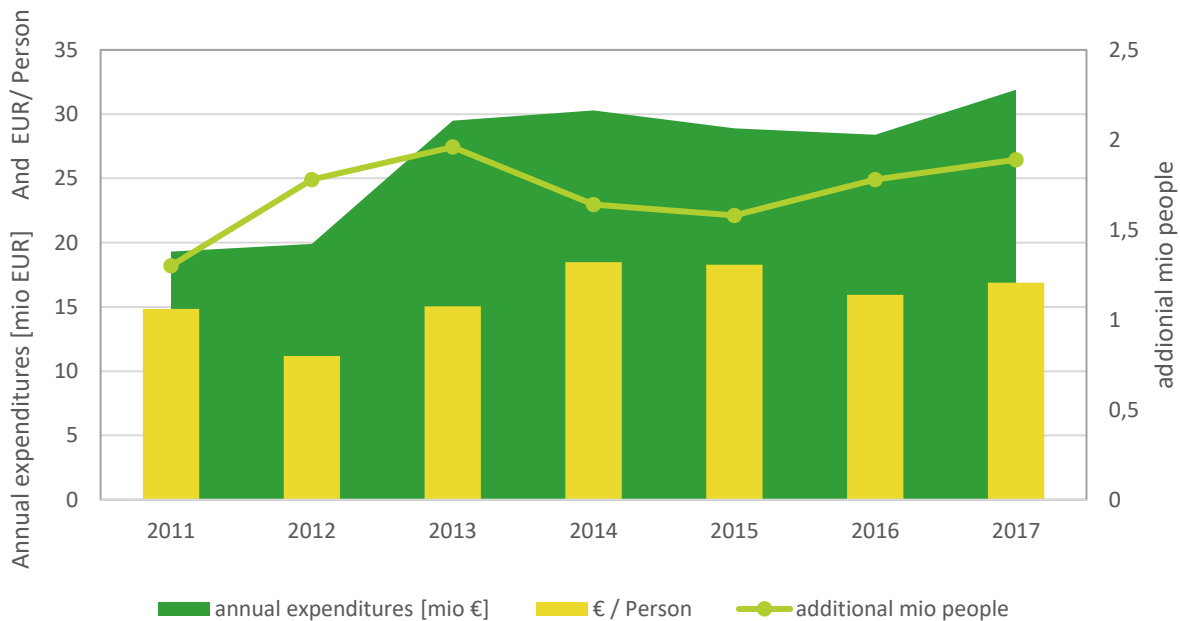


Within EnDev projects, a set of different energy technologies is promoted (figure B.7). Only the cost efficiencies of stove and picoPV activities are below the overall EnDev benchmark of EUR 20 per person.



While projects expenditures between 2014 to 2017 were on average around EUR 30 million per year, the achievement of additional targets as well as the overall cost efficiency show a slight decrease (Figure B.8).

Figure B.8: Overview development Targets/expenditures in projects/cost efficiency



The outcome figures reported in this report are verified in the field through detailed lists of customers of energy services and products, and/or sales figures of energy companies and retailers. In cases when not only EnDev but other international partners have been involved, only a part of the outcomes are counted according to the financial share of EnDev in the total cost of a measure. EnDev does also not simply sum up outcomes achieved in the course of the programme but tries to capture those processes which **reduce outcomes** through so-called adjustment factors. Thus, figures of six-month reporting periods are adjusted down before the total number of beneficiaries is presented to donors and the public. Up to now, EnDev applies **four adjustment factors** concerning sustainability, windfall gain, double energy and double EnDev counting. The background for each factors was described in previous progress reports.

In addition, the EnDev figures already include a discount for **replacement** which reflects the limited life span of some of the technologies promoted. This typically concerns cookstoves and picoPV devices: In order to continuously benefit from the service, the system may have to be bought more than once over the course of the project period. Some of the later-stage sales will go to beneficiaries reported before. It would therefore be wrong to simply add up all sales numbers. Only sales beyond replacement generate new access.

The update of the methodologic basis of the adjustment factors described above is slightly delayed and still ongoing. It is anticipated to test/pilot it for selected countries for the Progress Report 2018. Hereby EnDev aims to keep the accuracy of its monitoring data while reducing the complexity and the efforts that are required to keep it progressing.

Access to electricity

EnDev uses a tier system to define different levels of **access to electricity**. In this system, access to electricity is defined in terms of services, for which both “energy” and a device turning the energy into a useful service are required. As it is often difficult to directly monitor a service, access can be claimed by demonstrating access to the respective device and the required energy. Alternatively, access can be claimed on the grounds of certain electricity consumption.

The EnDev tier system is aligned with the Multi-Tier-Framework (MTF) of the SEforAll presented in the Global Tracking Framework (GTF). Based on this, EnDev electrification outcome figures in the different tiers for the **EnDev 2** phase are:

Table B.2: EnDev 2 outcomes according to the tier system for electrification

Tier	Services	Typical system	Number of people	%
5	tier 4 services plus use of devices typically requiring a few kilowatt like air conditioners	grid	767,649	18%
4	tier 3 services plus use of devices typically requiring a kilowatt like water heaters, irons	limited grid	330,405	8%
3	tier 2 services plus use of devices typically requiring a few hundred watt like rice cookers, refrigerators	mini-grid	172,667	4%
2	bright light, radio, telephone plus use of devices typically requiring tens of watts like TV, video, fan	solar home system	1,663,072	40%
1	medium bright light and, if possible, limited radio use and telephone charging	picoPV, battery charging station	1,280,796	30%
		total	4,214,600	

Access to improved cooking devices

The SEforAll tier system for **improved cooking systems** is still not 100% developed. Especially the health indicator is difficult to define for all levels. EnDev is involved in intense discussion with WHO, World Bank and partner organisations to finalize the matrix. The tier system currently implemented by EnDev is in line with the current state of the multi-tier framework presented in the 2015 tracking framework. EnDev outcomes are attributed to the 5 tiers as follows:

Table B.3: EnDev 2 outcomes in the EnDev tier system for improved cookstoves

Tier	Services	Number of people (EnDev methodology)	%
5	Access to needed quantity of energy source: ≥ very good	0	0
	Health protection: ≥ very high		
	Convenience: ≥ very high		
4	Access to needed quantity of energy source: ≥ good	102,160	1%
	Health protection: ≥ high		
	Convenience: ≥ high		
3	Access to needed quantity of energy source: ≥ fair	69,031	1%
	Health protection: ≥ fair		
	Convenience: ≥ fair		
2	Access to needed quantity of energy source: ≥ limited	5,985,800	54%
	Health protection: ≥ sufficient		
	Convenience: ≥ sufficient		
1	Access to needed quantity of energy source: ≥ deficient	5,004,833	45%
	Health protection: ≥ low		
	Convenience: ≥ low		
0	Access to needed quantity of energy source: ≥ highly deficient	16,494	0,1%
	Health protection: ≥ very low		
	Convenience: ≥ very low		
		11,178,318	

New jobs, training for the youth, and expanding businesses in rural Rwanda through village grids

Meshpower, one of EnDev Rwanda's first supported RBF Village Grid projects that has developed 20 - 4 Kw AC/DC - solar-powered pico-grids serving 600 customers, has secured further funding to expand its existing sites and connect an additional 2,000 people. A recent field trip to the initial EnDev supported sites highlighted both the positive impact on households as well as the new economic opportunities to local communities. The Meshpower mini-grid does not only provide lighting and phone charging to households but allows entrepreneurs to flourish and new businesses to emerge.

Martin Twagirimana (top right), owner of a small store and hairdresser, has managed to expand his business by purchasing new appliances, "I am using the Meshpower AC electricity since the end of June. Now I'm able to use devices like a hair straightener and a hairdryer".

Two textile entrepreneurs, Nyiramuhire Françoise and Jean Marie Sindambiwe (bottom right), have managed to increase their work hours due to the ability to sew and iron rather than travelling to neighboring villages to do so. "Now we save a lot of time and money for transport and service because we can do it ourselves", they say. The entrepreneurs additionally train the youth in their village in sewing.

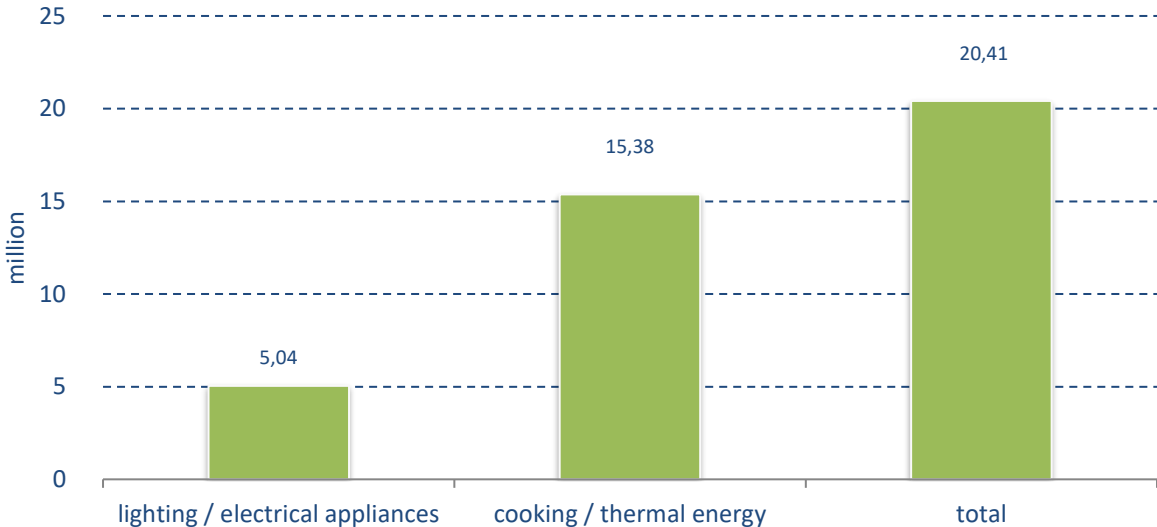
Meshpower has also provided direct employment opportunities by hiring local agents. Emanuel Mukomeza (bottom left), a local agent earns up to EUR 100/month and is responsible for six Meshpower sites. "I did an electricity course in highschool, so I have some knowledge about this. Before I got the Meshpower job, I was finishing school and did some farming", he says. The Meshpower mini-grids have had a visible impact on the lives of rural entrepreneurs and enterprises, promoting increased activity, value added, employment and the development of additional services and products.



B.2 Overall outcomes in the period 2005 – June 2018 (EnDev 1 + 2)

Looking at the overall EnDev programme, starting from phase 1 in 2005 up to June 2018 in phase 2, the **total number of people** having gained sustainable access to modern energy services on household level amounts to **20.4 million** (figure B.9). The total number of **social institutions** is more than **20,500**; the total number of **small and medium enterprises** is around **44,400**, respectively.

Figure B.9: Adjusted number of household members provided with modern energy services in a sustainable manner (EnDev 1 and 2 combined)



The absolute numbers of verified beneficiaries (taking into account replacement but not the adjustment factors described above) are 27.5 million for EnDev 2 and 36.4 million for EnDev 1 and EnDev 2 combined.

In addition to the main objective of the partnership to facilitate access to modern energy technologies and services, EnDev has four impact targets: **a)** climate mitigation, **b)** health prevention, **c)** improved gender balance, **d)** job creation, and two outcome targets: **e)** leverage of funds and **f)** increase of power generation with renewable energies.

CO₂ savings

An improved firewood cookstove, which saves 30% of firewood in practice and which is used to prepare 80% of all meals, saves around 0.55 t CO₂ per year (on average, over all EnDev stoves) compared to cooking on open fires. The total savings of all EnDev stoves for one year amount to approximately 1,850,654 t of CO₂. In addition, 214,651 t of CO₂ savings are generated for which emission reduction certificates are sold on carbon markets. Air pollutants as a result of incomplete combustion, including black carbon, are not included in this calculation.

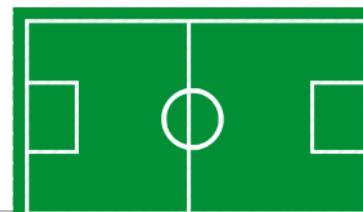


One electric lamp powered by SHS and mini-grid or grid connections replaces at minimum two kerosene lamps, thus saving at least 0.18 t CO₂ per year. A solar lantern replaces approximately one kerosene lamp, saving 0.09 t CO₂ per year.

The total CO₂ saving of 3.6 million stoves and access to solar home systems, mini-grid connections or solar lanterns for 1,159,286 households supported by EnDev are 2,233,805 t of CO₂.

For comparison: this amount corresponds to

- CO₂ emissions of all intra-European flights during 15 days, or
- Norwegian car traffic during 160 days, or
- 10 million return flights from Frankfurt to Oslo, or
- planting of more than 5 million trees on an area as big as 6,800 soccer fields.



An area of forest as large as 6,800 soccer fields are saved annually

Health

As a result of EnDev 2 activities the exposure level of indoor air pollution could be drastically reduced for more than 6.2⁸million household members (particularly women and children). The improvement of the health protection was achieved by:



- reducing the quantity of emissions of particulate matters and CO through **a)** improved cookstoves with higher combustion efficiency, and lower heat losses **b)** improved fuel quality and **c)** fuel switch;
- removing pollutants from the cooking site through chimneys, flues, hoods or ventilation;
- reducing exposure to pollutants through changed cooking practices and placing of the stove and kitchen.

The specific assessment of the health impact of promoted cooking solutions is based on the type of stove and fuel, the use of chimneys, flues or hoods, the degree of ventilation and the cooking place. Only cooking solutions classified in the EnDev tier framework⁹ as tier 2 or higher are considered to have potential to be sufficiently safe regarding exposure of household members to indoor air pollution¹⁰. These include all stoves using electricity or gaseous fuels as well as improved biomass stove (e.g. rocket stoves, gasifier stoves and others).

Gender impact

This paragraph presents data and findings on gender impacts in the period 2009 – June 2018.



The review of EnDev impact studies concerning gender-related effects provide ample evidence that access to modern energy improves:

employment of women and income generation: Studies from Ethiopia and Kenya, inter alia, 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. In Kenya, the share of women among active entrepreneurs both in solar and cooking technologies is slightly above 50%, however, women have less income sources, lower sales in both technologies, and work fewer hours on income generation and eventually earn 25 and 40% less than male solar and stove entrepreneurs, respectively. Further, males are 70% more likely to have customers beyond their county borders. This adds to the evidence from international studies¹¹ that the success of women entrepreneurs depends very much on the amount of household duties

⁸ All members of households that use a stove fulfilling the level 2 criterion for the health attribute of the multi-tier matrix for cooking solutions.

⁹ Closely related to the Multi Tier Framework

¹⁰ In 2018 and 2019 EnDev conducts various studies, in cooperation with RWI in Senegal and with Fresh Air in Uganda and a desk study with the University of Mexico to validate the impact chain of cookstove emission, indoor air pollution and personal exposure.

¹¹ See, e.g. Bradshaw, Castellino and Diop, 2013, Women's role in economic development: Overcoming the constraints, Background paper for the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda, page 8 ff., retrieved from: <http://unsdsn.org/wp-content/uploads/2014/02/130520-Women-Economic-Development-Paper-for-HLP.pdf>

additional to their business endeavours. Nevertheless, even with small additional income, women contribute to the household earnings and spend it for the benefit of the whole family.

medical services especially for women in health centres: Electrified health centres in Ethiopia now provide service also during night time which is specifically important for women in the final stage of their pregnancy;

indoor air quality in kitchen areas: In most cases women are responsible for cooking and thus benefit most from improved cookstoves that emit fewer pollutants. Considering the above figure on the number of people with access to tier 2 cooking solutions and assuming that 1/5 of the household members are women and 2/5 young children it can be concluded that around 1,23 million women and 2,46 million young children benefit from improved health protection;

safety against sexual harassments, due to electric light that provides safety both inside homes by decreasing the number of burns and house fires and outside homes in public spaces, and the reduction of collection time for firewood;

working conditions and comfort due to improved cookstoves that are easier to use and the replacement of kerosene lamps with PV-powered lamps (e.g. studies in EnDev Bolivia and Ethiopia).

Gender-disaggregated monitoring data about full time job creation is presented below.

Installed generation capacity with renewable energies

The total power capacity based on renewable sources installed since the start of EnDev 2 is 47.6 MW.



The biggest share amongst the technologies with 48.4% is contributed by SHS. SHSs contribute 23.0 MW to the total result. The share of mini-grids is nearly the same with 20.97 MW (MHP: 12.6 MW, PV: 8.3 MW). PicoPV systems up to now have a total installed capacity of 3.6 MW. It is estimated that an additional 15 MW have been installed in the first phase of EnDev resulting in a totally installed capacity of 62.6 MW.

Job creation

This paragraph presents data on employment effects for the period from July 2016 until June 2018.



EnDev project captures information about the time required for production of stove parts as well as for assembly and for installation. Based on the available data and the assumption of 250 working days per year with 8 working hours per day it can be calculated that 5,205 full-time equivalent jobs existed in the process steps of the production, assembly and installation of 1,701,645 stoves from July 2017 until June 2018.

Most of these work steps are not done by full-time labour. About 2/3 of the EnDev stove projects captured additional data about the number of people working in the production of stoves. These captured values (which include part-time labour) can be compared to the calculated full-time equivalents. The comparison reveals that on average 3.4 persons are involved for each full-time equivalent. Based on this ratio a total of 17,696 people worked in the production and installation of EnDev stoves during the last 12 months.

EnDev applied the methodology published by UNEP¹² for calculating the number of jobs created along the distribution chain. It resulted in additional 667 full-time equivalent jobs exist in the distribution chain for stoves. For picoPV systems, which are mainly produced in China, and for SHS the number of full-time equivalent jobs along the distribution chain was 914.

¹² Light and Livelihood: A Bright Outlook for Employment in the Transition from Fuel-Based Lighting to Electrical Alternatives; UNEP 2014.

The mini-grids projects supported by EnDev also create jobs. Temporary jobs that exist during the construction of the mini-grid sites have not yet been considered. During the operational phase there are jobs in operation of the plant, administrative and managerial tasks and security service. It is calculated that by mid 2018 in total 2,816 full-time equivalent jobs existed that were related to these work profiles at the mini-grids.

In addition to direct employment effects described above, EnDev also created indirect employment effects. Within the SMEs that got access to energy through EnDev it is estimated that 3,245 full-time equivalent jobs were created.

Altogether, 13,225 full-time equivalent jobs existed in the supply chain for energy access technologies as well as in companies benefitting from new energy access in our partner countries that can be assigned to EnDev.

Table B.4: Employment effect of EnDev

Type of Technology	Type of employment effects			
	Direct			Indirekt
	Production	Distribution/ Sales	Operation	SME's Application of Technologies
Cooking Energy	5,584	667		3,245
Solar light		914		
Mini-grids			2,816	
Total				
13,225				

Leverage

This paragraph describes leverage effects since 2015.



The total value of all stoves and off-grid systems sold or installed by companies cooperating closely with EnDev since 2015 was EUR 223,541,912 million, which is a ratio of 2.1 in relation to the programme expenditures of EUR 108 million.

Since 2015, the total amount of investments along the market chain including intermediary products but excluding expenditures for private consumption is about EUR 619 million in the current semester alone, representing a ratio of 5.74 in relation to the EnDev programme expenditures.



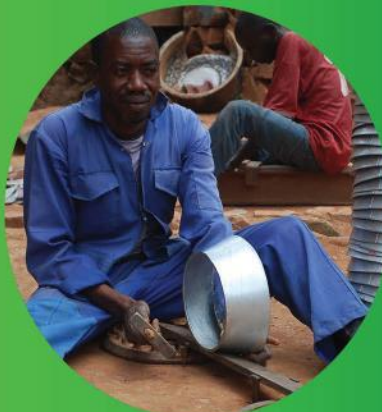
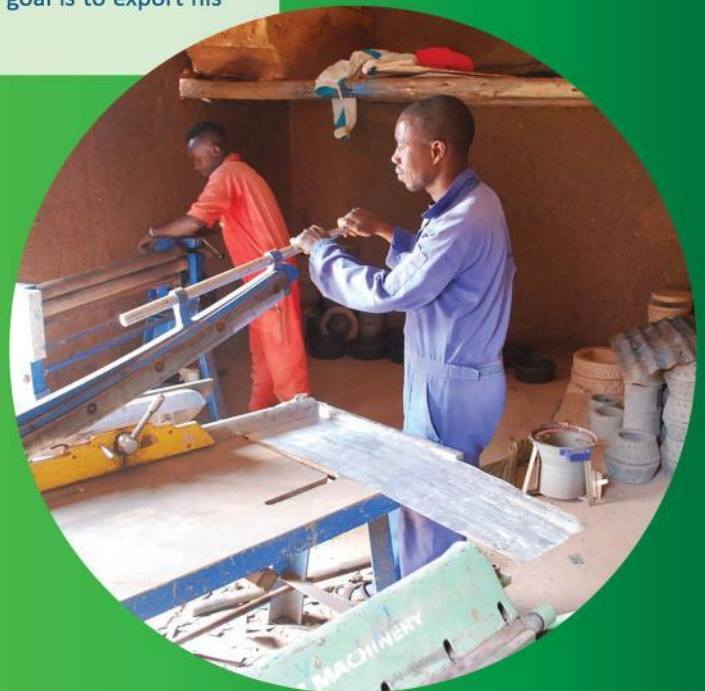
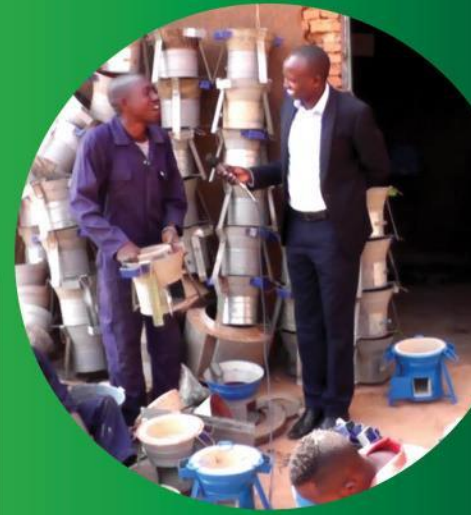
Nyoni Déodat, producer of improved cookstoves and successful businessman in Burundi

Nyoni Déodat (top right), married father of six children, was born in a poor family. He grew up in Gitega, the second largest city in Burundi. His father was illiterate and did not have enough money to pay for Nyoni's school fees. Instead, Nyoni started working very young, at age 12. At first, he worked as a metal worker in a workshop of a neighbour who produced braising pans. Nyoni was paid according to the number of pans made per day. His daily salary was around FBU 1,000 (EUR 1).

When he was 18, Nyoni set up his own workshop with the support of a GIZ (then: GTZ) project that had just introduced improved clay stoves. He manufactured stoves and the metal sheaths, and sold the stoves on the Gitega market. With the stoves he could increase his income from FBU 30,000 to about FBU 50,000 per month.

Since 2016, Nyoni has been manufacturing the Biikigiti Kazoza stove that was introduced to Burundi as a variation of the EnDev Tanzania stove model. Nyoni's stoves are now sold on all major markets of Burundi. In fact, they are so high in demand that Nyoni cannot fully meet the demand. His current salary has increased from about EUR 50 to EUR 300 a month, which allowed him to build a house in Gitega and pay the school fees of his children. Today, he employs 15 permanent staff in his workshop.

Nyoni Déodat plans to open another workshop in Bujumbura, the capital of Burundi. There he aims to double Gitega's production. His long-term goal is to export his stoves to DR Congo and Rwanda within the next five years.



C. Portfolio review

The objective of the portfolio review is to provide a strategic review of EnDev's country projects as well as recommendations for a balanced portfolio development approach to ensure target achievement while gradually adapting country projects to the priorities of EnDev's strategy 2019-2022. The portfolio review concludes with a recommendation on the categorization of countries, i.e.:

- Countries with a **long-term EnDev involvement** allowing for planning security (3-4 yrs.)
- Countries with a **medium-term EnDev involvement** allowing for flexibility in the portfolio (1-3 yrs.)
- Countries with an **ending EnDev involvement** allowing structured phasing out (up to 1 yr.)
- Potential new countries for a **new EnDev involvement** (1-3 yrs.)

An extensive portfolio review is carried out between phases. Annually, a light version of the portfolio review will be implemented advising on the strategic direction of the portfolio and on the performance of individual projects. As progress in projects will be annually reviewed, funds may be (partially) reallocated to manage for maximum results and impacts in case of significant delays or underperformance.

According to the categorization of a country and thus the time horizon for EnDev's involvement, a competitive programming (call for proposals) with core implementers will provide a scope of intervention options where the most appropriate proposal will be selected and suggested for approval by EnDev's Governing Board according to a set of pre-defined criteria. In case projects are running well according to the portfolio review the existing implementer will be invited in order to sustain successful structures and to keep transaction costs low. In case of a comprehensive re- strategizing of a project's approach or low performance of projects (or components), as well as new countries or components the competition will be open. After evaluation, the most promising concept notes will be invited to write a full proposal for a competition for the available budgets. Selected options will include a budget estimate with fixed as well as flexible costs, thus allowing for periodical re-allocation of funds based on regular annual progress and performance assessment if necessary. Although competitive, implementers may also decide to put forward joint and integrated country proposals for funding in case they complement one another.

In order to allow for enough time to develop proposals according to the country categorization after the decision by EnDev's Governing Board on the portfolio review, all projects (which are currently ending in the next months) are suggested to be extended until 09/2019 (see [Planned country activities in 2019](#)). There are a few exemptions of projects which already have a slightly longer duration. Financial topping up will be on a minimum level as the overall financial situation remains extremely limited.

RBF projects were assessed separately as part of the RBF review and consolidation process with DFID. Where mainstreaming of RBF approaches into regular EnDev country projects beyond the RBF Facility seems most promising and feasible, these RBF projects/components were included in the EnDev portfolio review.

Proposal development as noted above will start at the beginning of 2019. Project duration extensions according to the country categorization are going to be reflected in the Annual Planning 2019 Update which will be presented to EnDev's Governing Board in late spring / early summer 2019.

C.1 Portfolio development

The portfolio review 2018 was conducted for 24 EnDev country projects¹³ and consists of a quantitative and qualitative analysis of their relevance, performance, and potential. The portfolio review uses a systematic approach to describe, assess and categorise EnDev country projects along the OECD DAC criteria. EnDev country projects were asked to provide information in Project Analysis Sheets (PAS) on the following aspects:

- **Relevance:** providing projects' key facts at a glance – considering aspects such as geographical region, economic situation, energy access situation, existing partnerships and co-financing, and relevant innovative approaches.
- **Performance:** describing projects' performance over time – considering the effectiveness of providing access to energy for households, social institutions and productive use, as well as the cost-efficiency of interventions.
- **Potential:** outlining projects' future potentials to contribute to sector transition and impact areas – considering the general potential to maintain or even improve past access performance in the context of latest sector and market conditions and trends, as well as reflecting on project's alignment with national policy, additionality of interventions, strategic partnerships, and external risk/mitigation potential.

Each individual PAS was prepared by the EnDev country team and (where applicable) the local project managers of the involved implementing agencies. Where applicable, country projects were also asked to undertake or update their Energy Access Market Development (EAMD) scorecards. Results were used to back market and sector assessments conducted by the projects. In addition, EnDev management provided quantitative information on the projects' performance displayed in graphs on relevance, effectiveness, efficiency, and country background.

For objective comparability, information in the PAS on key facts are cited from official global sources. In some cases, EnDev country teams reverted that these figures might not reflect the full picture of the energy situation as it is observed or experienced "on the ground".

The individual PAS were reviewed by two external evaluators to provide EnDev management with an independent external assessment. In a first step, the external reviewers checked for completeness and consistency providing feedback to country backstoppers to ensure the comparability of the PAS. In a second step, the external reviewers interviewed country managers and/or project managers on the strategic potential of the projects considering sector and market conditions as well as partnerships and external risks. In a third step, the external reviewer analysed the projects based on the PAS, the interviews and additional project information such as EAMD scorecards (see **Fehler! Verweisquelle konnte nicht gefunden werden.**) and country sheets (see **Fehler! Verweisquelle konnte nicht gefunden werden.**).

Based on this analysis, external reviewers provided input on the categorisation for each project. EnDev management further consolidated this input by additionally applying a strategic perspective to develop a balanced portfolio representation of countries, technologies, target groups, and tier distribution. The following table shows the country categorisations:

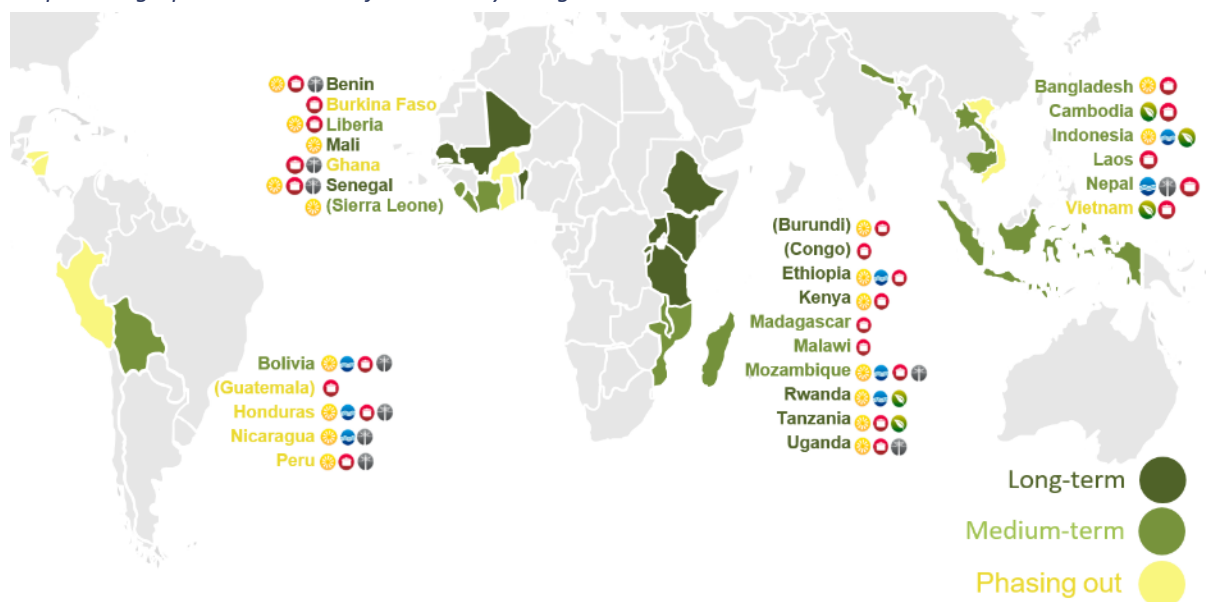
¹³ Included in the portfolio review are only those EnDev country projects for which a closure is not already undergoing (Peru and Vietnam); the regional Mekong project was allowed to submit PAS for each country component.

Table C.1: Portfolio review 2018 and country categorization

Category	Sub-Sahara Africa	Asia	Latin America
Long-term involvement	<ul style="list-style-type: none"> • Benin • Ethiopia • Kenya • Mali • Rwanda (with Burundi & DRC) • Senegal • Tanzania • Uganda 		
Medium-term involvement	<ul style="list-style-type: none"> • Liberia (with Sierra Leone and Guinea) • Madagascar • Malawi • Mozambique • (Somalia) 	<ul style="list-style-type: none"> • Bangladesh • Indonesia / biogas • Mekong / Cambodia • Mekong / Laos • Nepal • (Myanmar) 	<ul style="list-style-type: none"> • Bolivia
Phasing out	<ul style="list-style-type: none"> • Burkina Faso • Ghana 	<ul style="list-style-type: none"> • Cambodia / biogas • Indonesia / mini-grids • Vietnam • Mekong / Vietnam 	<ul style="list-style-type: none"> • Central America (Guatemala, Honduras, Nicaragua) • Peru

Geographic distribution of the country categorization is as follows:

Map 1: Geographic distribution of the country categorization.



With 18 projects remaining for long and medium-term interventions, EnDev will be active in 22 countries (due to several multi-country projects). The resulting portfolio would show changes with regard to the following aspects:

- **Geographical coverage:** EnDev will further increase its focus on Africa with 16 countries (currently 18), of which 9 are long-term involvements. EnDev's presence in Asia will be limited to 5 medium-term countries (currently 8), while only 1 medium-term country remains out of currently 5 Latin American countries.
- **LDC focus:** EnDev will increase its focus on economically weak countries with 19 countries being low income countries (currently 21), while only 3 lower or upper middle income countries would remain (currently 10).
- **Technology:** The scope of technologies supported by EnDev would largely be sustained, only biogas support would significantly be reduced with only 1 future component (currently 4), while there will be 16 ICS components (currently 22). In the field of electrification, EnDev will support 13 picoPV/SHS components (currently 17), 5 mini-grids components (currently 9), and 6 projects with a grid densification/extension component (down from 9).
- **Implementers:** EnDev would largely maintain its current implementation mix with 15 components implemented by GIZ (currently 22), 5 components implemented by SNV (currently 9), and one project each implemented by HIVOS, ADES, and Practical Action (currently 1, 2, 1, plus an additional CLASP component).

As noted, the focus on Sub-Saharan Africa would increase: Around 70% of the committed EnDev 2 funds are currently allocated to this part of Africa (figure C.1). The share of least developed countries (LDC) supported by EnDev would be 71% (figure C.2).

Figure C.1: Funding by region
(Portfolio review AP19)

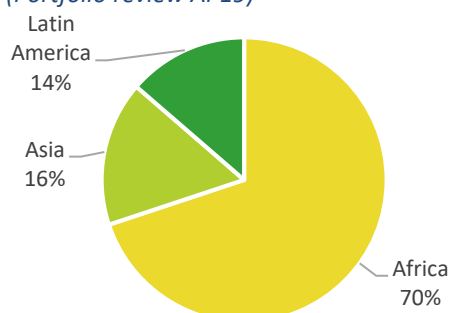
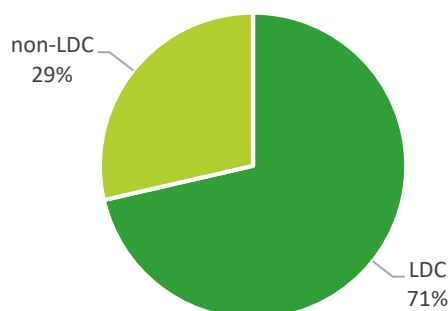


Figure C.2: Funding by countries
(Portfolio review AP19)

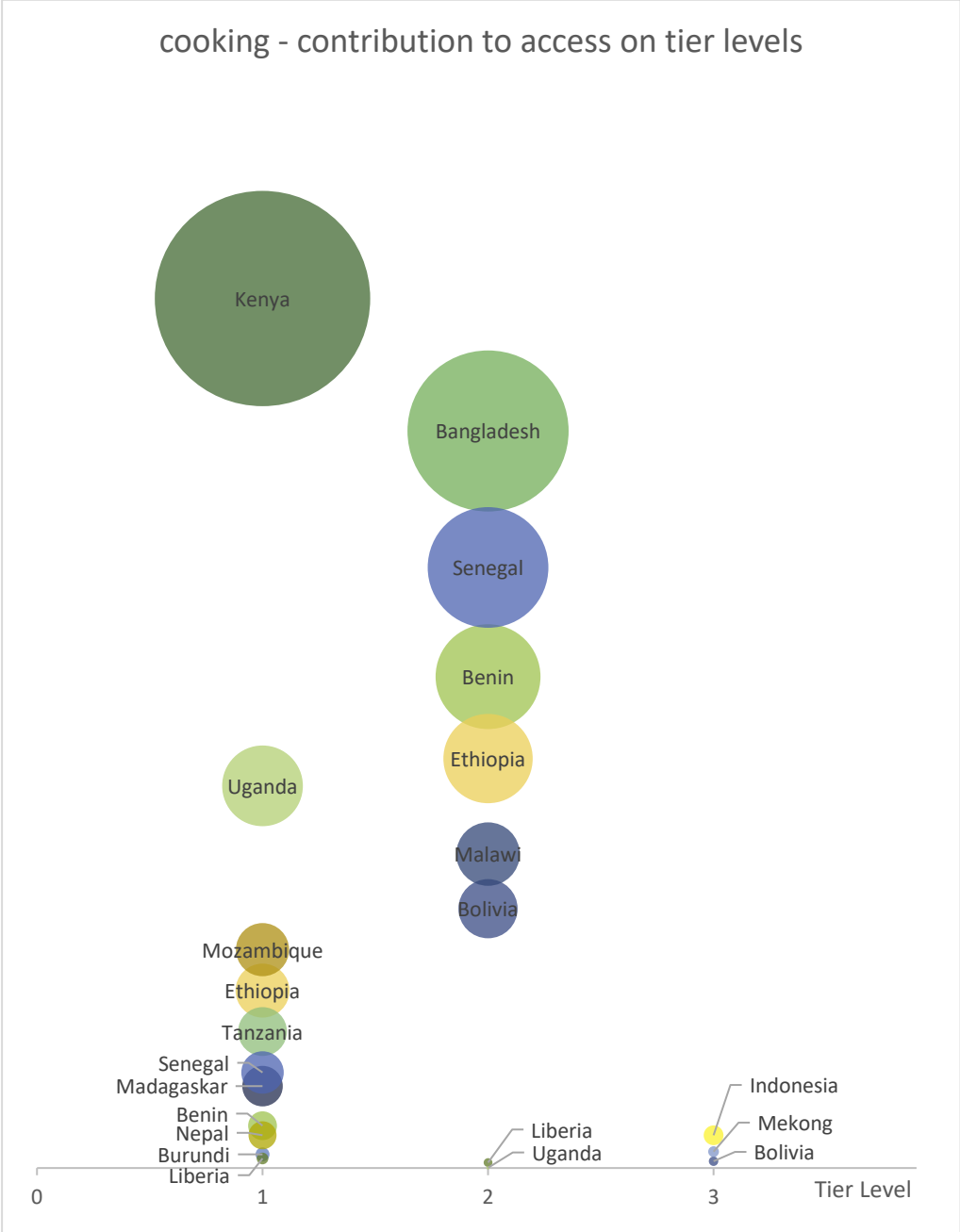


It is important to note that target achievement of the future portfolio would be lower if projects' interventions will not be re-strategized and adapted. Implications for PU and for SI would be significant due to the strong performance in these categories of, for instance, countries in Latin America and South-East Asia which are suggested for phasing out. This calls for renewed focus on these target areas as part of the the strategizing and adaptation of country projects.

The effect on household level will show a higher significance for the higher tier levels due to phase out of biogas, grid and mini-grid projects. Similar effects can be observed for employment effects and installed generation capacity.

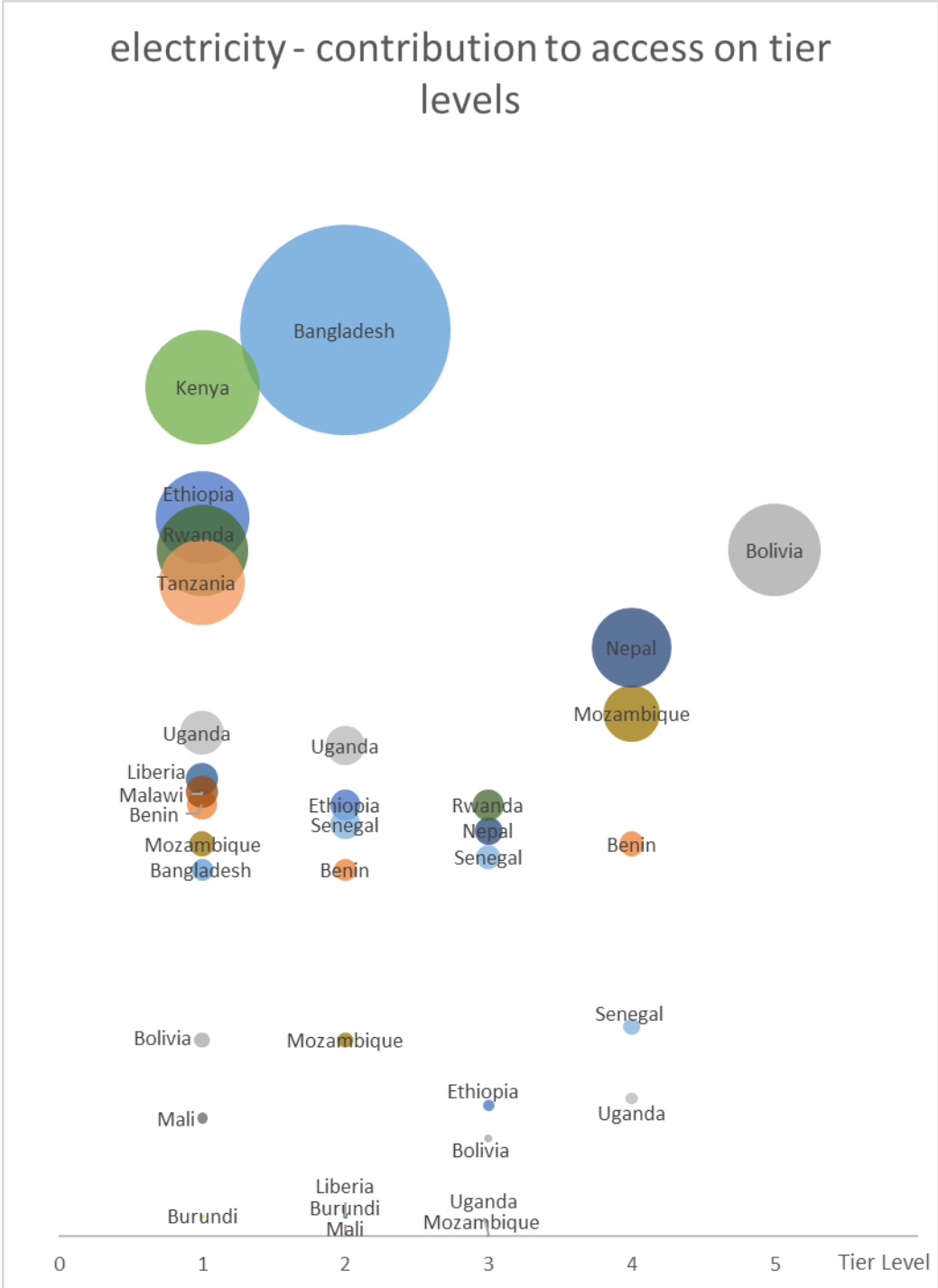
In the context of the strategic discussion on promoting higher tier energy access, the following two plotted graphs for cooking energy and electrification provide an overview and relative comparison of the respective contributions to tier levels of different country projects.

Figure C.3: Cooking Energy - Tier levels.



For cooking energy and as shown in figure C.3, the future portfolio comprises six countries with high contributions to tier 1 and tier 2. Several additional projects contribute medium to smaller shares to the portfolio. Access to tier 3 is provided in three countries at a small share. No interventions yet reach tier level 4. In future programming, EnDev will apply a parallel strategy of supporting stoves in lower tier segments next to the introduction of technically more advanced cooking systems (including BLEENS) in higher tier segments. It seems realistic that the larger share in terms of sheer numbers for target achievement will most likely continue to be in the lower tier segment.

Figure C.4: Electricity - Tier levels.



For electrification and as shown in figure C.4, in the future portfolio four countries for tier 1, one country for tier 2, and one country for tier 5 represent highest contributions to target achievement. Two further countries on tier 4 and one country on tier 1 and 2 contribute a medium share to the overall target achievement. Several additional countries contribute smaller shares along tiers 1 to 4. For future programming and with regard to higher tier electricity access as well as the productive use of energy, EnDev will assess its stand-alone and mini-grid support as well as its grid extension and densification activities.

C.2 Indications for future programming

As part of the portfolio review, each project is presented with a very brief analytical overview according to its categorization. This also includes a concise indication on future programming for EnDev's next phase. Detailed country information can be found in the PAS (see [Fehler! Verweisquelle konnte nicht gefunden werden.](#)) and CS (see [Fehler! Verweisquelle konnte nicht gefunden werden.](#)).

For some countries phasing out was previously decided and is not further elaborated at this stage. This refers to Peru and Vietnam (biogas).

RBF projects were recently assessed in a separate consolidation process on request of DFID. (Respective information was included in EnDev's Progress Report 2017 but can also be found in this report.) At the same time, RBF projects – although governed by their own logic, rules, and procedures – are being mainstreamed and have been considered as part of a country's set of components and interventions in the portfolio review. Regional RBF projects have not been separately reviewed except for the Mekong advanced biomass cookstoves project.

Table C.2: Categorization of country projects and further info.

Category	Country project	Further info
Long-term	Benin	<p>The country has an electrification rate of 41% and an access to clean cooking rate of 6%, so leaving 6.5 million and respectively more than 10 million people without access. In relation to its budget, the project is delivering high targets for household access via its strong and cost-efficient ICS component, while its solar component is in transition to full RBF mode and needs more time to realize targets. Due to its work on transforming the ICS market, the project was able to make a considerable contribution to local job creation.</p> <p>In future programming, it will be explored how interventions in the solar sector might need to reflect or be adapted to the political situation.</p>
	Ethiopia	<p>Ethiopia is a SEforAll high-impact country both for electricity (rank 5) and cooking (rank 7). Ethiopia has about 60 million people without access to electricity and about 100 million people without access to clean cooking. EnDev's interventions on electrification (MHP and picoPV), clean cooking, and social institutions are well aligned to national policy. Through parallel RVO funding, the establishment and development of the government led <i>Ethiopia Clean Cook Stoves Association</i> is supported. Developing mini-grids using an EPC model is innovative in the Ethiopian context and serves as a demonstration for potential up-scaling. The project has over EUR 20 million of earmarked funding of which EUR 13.4 million is from additional donors (EU, Irish Aid, KOFIH). It has strong partnerships with relevant development partners, e.g. EnDev Ethiopia is the key pillar in the EU support strategy for the energy sector.</p> <p>Future programming will explore, how EnDev can use its diverse portfolio and position to further strengthen sector cooperation with and between key development partners in Ethiopia, and how EnDev can help move the sector from demonstration to transformative scale.</p>
	Kenya	<p>Kenya is a SEforAll high-impact country both for electricity (rank 9) and cooking (rank 12). EnDev Kenya is a key performer of the EnDev portfolio in terms of target achievement for household access to clean cooking and electricity. The broad scope of supported technologies, sub-sectors, and approaches makes Kenya an EnDev showcase. Key partnerships with GACC and the current GCF application could further increase the flagship character of the country.</p> <p>Future programming will explore how partnerships could be further developed. To mitigate fragmentation, an integration of the different components, currently under different responsibilities of four implementing partners, into one comprehensive support programme (with multiple implementers) will be encouraged.</p>

Mali	<p>Although effectiveness in electricity access for households was low in the past, the project is currently in a transition towards a new approach of providing cost-efficient electricity access for remote, but concentrated communities. Mini-grids are politically supported, but an enabling environment and regulation is just evolving; picoPV / SHS market is in pioneering stage, with new actors entering the market. In Gao, Northern Mali, EnDev has successfully established street lighting in major roads. Project interventions have high added value, but scale-up potential must yet materialize.</p> <p>For future programming, EnDev will evaluate activities including the exploration of other sub-sectors (like clean cooking), and including a possible integrated multi-implementer approach.</p>
Rwanda (with Burundi and DRC)	<p>Rwanda represents a very poor but dynamic country, which is politically stable and open to market-oriented approaches. The picoPV component has been successful in pulling a number of strong and competitive PAYGO companies into the country. The mini-grid RBF project has paved the way to access larger funds (SREP, NAMA) in which EnDev might take up the role of a technical support unit. New activities on ICS are in initial phase and their potential still needs to be assessed. Future involvement depends on balancing activities in reliable but crowded (low additionality) Rwanda and the largely neglected but high-risk Burundi and DRC.</p> <p>For future programming, EnDev will further explore its involvement in clean cooking and the most suitable implementation structure. EnDev's role in picoPV and mini-grids will be assessed, balancing additionality and transformative potential. In future programming, it will also be assessed to what extent Rwanda can grow into a regional hub, launching a platform for activities in Burundi and DRC.</p>
Senegal	<p>With an electricity access rate of 65% and a clean cooking access rate of 32%, Senegal still has about 5.5 million people without access to electricity and about 11 million people without access to clean cooking. The project is one of the top performers in terms of effectiveness and cost-efficiency: it has overachieved its already high household targets in clean cooking access and electricity access, as well as SI access. Despite several barriers, the ICS market is expanding, allowing EnDev to revise targets to 500,000 annual ICS sales in 2024 assuming additional GCF funding is available. The electricity component is well established, and focuses on sustainability of mini-grids, grid densification, and stand-alone systems. Joint implementation with a GIZ employment programme to promote productive use has been done.</p> <p>In future programming, EnDev will assess the solar component. The mini-grid component is vulnerable to the availability of a compensation fund for operators, which is currently unsure. This will be further explored.</p>
Uganda	<p>As a SEforAll high-impact country for electricity and cooking (both rank 13), Uganda is a relevant EnDev target country. EnDev Uganda shows a high clean cooking access performance and supporting ICS markets with an emphasis to develop national semi-industrial stove production capacities. Uganda also promotes solar market development and has a DFID co-funded refugee pilot project.</p> <p>For future programming, a consolidation of core activities will be explored to mitigate fragmentation and increase impact. Interventions in picoPV and stand-alone systems will be re-strategized to reflect the dynamic market development of the past years, leading to a possible stronger shift towards the productive use of energy.</p>
Tanzania	<p>As a SEforAll high impact country, both for electricity (rank 11) and cooking (rank 10), Tanzania has high potential. The project has a good performance and high cost-efficiency for electricity (also due to focus on lower tier picoPV). Even with a solar market in expansion phase in the Lake Zone, there remains plenty of</p>

		<p>potential to promote expansion into other areas or productive market segments. The project emphasizes inclusion and gender aspects, especially targeting vulnerable and refugee households. A formal ministerial implementation agreement provides the formal framework for an extended EnDev involvement until 2023.</p> <p>In future programming, it will be explored how interventions can be linked stronger to productive use of energy, particularly in irrigation, livestock, fishing and value-added processing.</p>
Medium-term	Bangladesh	<p>Bangladesh is a SEforAll high-impact country for cooking (rank 4) and represents a key performing country of the EnDev portfolio in terms of modern cooking household access target achievement. The ICS component faces challenges building commercial markets for fixed and metal stoves, due to parallel governmental sector interventions (with World Bank and additional future GCF funding). A UNFCCC carbon financing project has been recently registered, making additional funding available. Due to policy changes, EnDev decided to end interventions in the picoPV segment and is currently limiting its activities in the solar sector on the support of innovative pilot activities.</p> <p>For future programming, solar pilot activities will be explored with regard to their potential for upscaling. It will also be assessed how latest developments in the ICS sector shall be reflected. Broadening or shifting EnDev implementing partners will be included in the assessment.</p>
	Bolivia	<p>The country has a high electrification rate (93%) and a relatively high access to clean cooking rate (64%). People without access tend to live in very remote areas, requiring EnDev to work with pro-poor targeting strategies that imply higher costs. The current strength of the project is its significant contribution to EnDev's overall SI and PU targets. The Bolivian ICS sector is dominated by the Malena cookstove product family for which EnDev support has ended; the new ICS strategy focuses on attracting ICS producers from Peru, but it is too early to say whether this approach has potential. Effectiveness of involvement in the solar market also remains to be seen. The project re-prioritized, putting its focus on PU and the establishment of the fund FASERTE as an important element for sustainability and phasing out EnDev support.</p> <p>In future programming, EnDev Bolivia might serve as a regional hub to support the three energy access funds (Peru, Central America, Bolivia) in gaining financial and managerial independence. Maintaining EnDev activities in Latin America calls however for a principle discussion in EnDev's Governing Board. Meanwhile it is recommended to provide a 2-year funding horizon to the project.</p>
	Indonesia / biogas	<p>Being a SEforAll high-impact country for clean cooking (rank 6) with a massive target group for biogas, the project has potential as the public LPG project is struggling to penetrate rural areas. However, progress has not developed as planned and the project's influence on government policy to promote more market-oriented approaches and to increase availability of consumer financing remains rather limited.</p> <p>For future programming, it is recommended to provide a 2-year funding horizon allowing for a structured phasing out.</p>
	Liberia (with Sierra Leone and Guinea)	<p>Liberia with Sierra Leone and Guinea belong to the poorest countries in the world with a combined population of about 25 million. As ICS and solar markets are only at pioneering stage and effective demand is low, potential for quick progress in these sub-sectors remains very limited. The project therefore also focuses on SI and PU. An innovative sustainability approach was developed for the about 1,000 health and educational facilities supported by the project pioneering IT based monitoring.</p>

		For future programming, the project's role to serve as a regional hub will be evaluated. It will also be explored which intervention areas have the largest potential for a streamlined approach.
Madagascar		<p>As a SEforAll high-impact country (rank 16) with only 1% of the population having access to clean cooking, Madagascar is a highly relevant target country for ICS interventions. EnDev focuses on strengthening the local ICS production capacities. Offering stoves for households, as well as for SI and PU, the project has a high cost-efficiency due to a co-funding from carbon financing and donations that the implementers have been able to mobilize. The unique feature of this project is the corporate responsibility approach offering more than minimal wages and extra benefits, while doing additional work on environmental protection and awareness raising.</p> <p>In future programming, it will be explored how the approach could become more transformational to bring the project to scale. This exploration should also include a (long-term) exit strategy.</p>
Malawi		<p>Malawi is one of the poorest countries of the world and a SEforAll high-impact country for electrification (rank 19). The ICS component shows significant success and potential, but also the picoPV component is gaining more momentum. The country has a strong policy alignment with potential to influence public policy and programmes (leverage).</p> <p>In future programming, EnDev will assess cooperation and co-financing opportunities in Malawi in particular for the pro-poor social cash transfer scheme of the ICS component.</p>
Mekong Cambodia	–	<p>About 68% of Cambodia's population have access to clean cooking leaving about 5 million people without access. Within the RBF Mekong project, Cambodia showed a medium performance due to very early market phase for advanced biomass cookstoves (tier 2-4 gasifier stoves). Nevertheless, market development is promising with national producers emerging.</p> <p>For future programming, EnDev will explore how to further contribute to market development for advanced biomass cookstoves, i.e. how to support emerging national producers but also national spin-offs of international producers. It will also be explored whether Cambodia might serve as a regional hub to include Laos. Questions of additionality need to be answered due to grant financing from Nordic Climate Fund to selected producers.</p>
Mekong – Laos		<p>Only 6% of Laos PDR's population have access to clean cooking, leaving 6.5 million people without access. Within the RBF Mekong project, Laos had a very low target achievement due to very early market phase for production and sales of advanced biomass cookstoves. The lower tier ICS market is relatively well developed.</p> <p>For future programming, EnDev will evaluate how to contribute to market development for advanced biomass cookstoves as part of a regional approach via Cambodia.</p>
Mozambique		<p>The country has a high potential for electrification and clean cooking energy with access rates being very low (24% and 4% respectively) and is also a SEforALL high-impact country for electricity (rank 14) and cooking (rank 15). The EnDev project has a high potential to contribute to picoPV and ICS market transformation and to pilot innovative results-based approaches that provide gender incentives and a bonus for certain target areas and income groups. The project plays a substantial role in sector coordination, lobbies for market-based approaches, and supports the government in creating a national monitoring platform for energy access. It has joint implementation with a GIZ employment programme for job creation, and is currently assessing cooperation opportunities with AVSI. Efficiency is appropriate taking higher tier access (50% higher tier ICS; grid densification) into consideration.</p>

		For future programming and with significant funds entering the Mozambique solar sector (BRILHO), EnDev will need to investigate its additionality in the sector and possibly a repositioning. EnDev will appraise the project to also further explore its transformation potential.
	Nepal	<p>The country has an electrification rate of approximately 45% in rural areas and an access to clean cooking rate of approximately 26%. The project has performed well in relation to PU overachieving its targets, which were already high in relation to its budget. Stoves with smoke hoods deliver good health impacts but are also more expensive and therefore rank lower on cost-efficiency. Despite working in a country context characterised by high subsidy interventions, the project was able to introduce new financing concepts such as a revolving Micro Hydro Debt Fund (MHDF), including a targeted window for grid connections for poor households.</p> <p>For future programming, existing intervention strategies will be revised and updated. Broadening or shifting EnDev implementing partners will be part of this assessment.</p>
Ending	Burkina Faso	<p>Burkina Faso is a SEforALL high impact country for electricity (rank 16). Although the country has over 17 million people without access to clean cooking, the project sees a stagnating trend in ICS target achievement. This is due to serious delays in the implementation of the key strategy to professionalize the ICS value chain. Efficiency is expected to increase after completion of production centres and development of professional distribution channels. An exit strategy is foreseen that allows phasing out the support to the semi-industrial ICS producers and a hand-over to a cooperative-like organisation (Nafa Naana).</p> <p>After phasing out and depending on future funding situation, EnDev might ask for an expression of interested from its implementing partners to re-strategize and restart EnDev's involvement in the country.</p>
	Cambodia / biogas	EnDev separated from the public biogas program promoting brick digesters and introduced mass-produced plastic digesters. Due to difficult sector conditions and a recent strategy change, the project shows a poor performance in terms of effectiveness and cost-efficiency. While the biogas market is estimated to comprise some 500,000 cattle owning households and shows limited positive signs of investment, market growth remains uncertain, and threatened by competition with highly subsidised brick digesters.
	Central America	EnDev managed to successfully establish FOCAEP, a fund with a window for financing ICS interventions and soon for solar PV in Nicaragua, Honduras and Guatemala. EnDev support for FOCAEP is still necessary in terms of organisational development and developing a fund-raising strategy. This will be done as part of the handover during the phasing out. Activities in Nicaragua are on hold.
	Mekong Vietnam –	Although 67% of Vietnam's population have access to clean cooking, it is one of the SEforALL high-impact countries for clean cooking (rank 14). Within the RBF Mekong project, Vietnam showed good targets as the country already had local producers, although overall target achievement was low. However, the RBF incentives triggered increased local production of advanced biomass cookstoves and expansion of stove producers' geographical outreach.
	Ghana	The grid component has reached an exit stage with EnDev handing over experiences to the privatised utility. Activities on solar irrigation and thermal agro-processing have been successful but unable to push markets into expansion phase reaching exponential growth characteristics. With interventions on PU, EnDev Ghana has not been able to reach efficiency targets. However, the project has been strong in job creation and local economic development due to its support to industrial zones and local enterprises.

		<p>After phasing out and depending on future funding situation, and as a follow-up to its sector support activities to GHACCO, EnDev might explore a re-engagement in case a strategic cooperation with key development partners in the cooking sector (ESMAP, GACC) may materialise.</p>
Indonesia mini-grid	/	<p>With over 700 mini-grids supported, the project represents EnDev's key experience in quality assurance of installation and O&M, as well as community ownership of mini-grids. The current strategy is pursuing an exit strategy by focussing (a) on establishing good practice examples and tools for a sustainable operation of mini-grids at local government level and (b) on promoting productive use of power within the mini-grids to increase the economic viability of operation. The focus of the phasing out will be to allow structured handover to local partners.</p> <p>After phasing out and as part of the documentation of lessons learnt and making these available within EnDev and beyond, EnDev will continue to be actively engaged from headquarters side to sustain global knowledge management on the vast Indonesian experience with mini-grids.</p>

C.3 Planned country activities in 2019

The total budget of the second phase is currently EUR 331,1 million. Below, an overview of all country activities is provided. Table C.3 gives a summary of ongoing and unchanged projects (compared to the previous Annual Planning 2018 Update document), table C.4 presents the country activities that are proposed to be extended and/or expecting a change of budget. Table C.5 shows ongoing EnDev sector development activities whereas EnDevs activities in the context of refugees and stabilisation in fragile environments are described in Table C.6.

Table C.3: Ongoing country activities under EnDev 2 *without changes*.

Country	Activities	Project duration		Funding	Planned outcomes on HH level
		start	end	in EUR 1,000	in persons
Madagascar	stoves	12/12	12/19	800	130,000
Nepal**	stoves, hydro, grid	05/09	12/19	7,915	502,755
Peru	solar, stoves, grid, SWH	06/09	06/19	17,257	1,976,161
Vietnam	biogas	07/13	12/20	5,240	375,000
RBF Mekong (Cambodia, Laos, Vietnam)	stoves	03/15	12/18	2,436	128,000

Table C.4: Country activities with *change of budget, target and project duration*.

Country	Activities	Project duration			Funding in EUR 1,000		Planned outcomes on HH level in persons	
		start	old end	new end	old funding	new funding	old target	new target
Bangladesh *	solar, stoves, stoves-RBF ¹⁴	06/09	06/19	09/19	25,069	25,809	7,100,000	7,100,000
Benin **	solar, stoves, grid, picoP	10/09	06/21	06/21	15,808	16,188 ¹⁵	1,675,000	1,675,000
Bolivia *	solar, stoves, grid	10/09	08/19	09/19	16,000	16,090	926,600	926,000
Burkina Faso*	solar, stoves	10/09	03/19	09/19	7,597	7,797 ¹⁶	1,600,000	1,600,000
Cambodia *	biogas	12/12	06/19	09/19	2,550	2,950 ¹⁷	34,000	34,000
Central America *	solar, stoves, hydro, grid	09/09	04/19	09/19	17,590	17,640	475,370	475,370
Ethiopia	solar, grid stoves, hydro	01/10	12/20	12/20	34,086	30,131	1,872,500	1,792,500
Ghana *	solar, stoves, grid	01/10	06/19	09/19	3,675	3,845	Mainly SME	Mainly SME
Indonesia *	biogas	12/12	03/19	09/19	2,500	2,690	61,750	61,750
Indonesia	solar, hydro	05/09	08/19	09/19	12,760	12,800	228,000	228,000
Liberia *	solar, mini-grids, solar dryers, stove	05/12	06/19	09/19	5,428	5,668	97,500	97,500
Kenya **	stoves, picoPV, SHS, mini-grids	04/09	06/19	09/19	22,515	22,515	7,574,945	7,838,500
Malawi **	solar, stoves	12/12	06/19	09/19	4,190	4,390	1,094,500	1,094,500
Mali *	solar, mini-grids, e-kiosks	01/13	06/19	09/19	4,500	4,690	140,000	140,000
Mozambique *	solar, stoves, grid	10/09	08/19	09/19	15,900	15,970	615,000	615,000
Rwanda (with BI, DRC)**	solar, hydro, biogas, stoves	10/09	06/19	12/20	21,240	20,950	1,479,618	1,249,115
Senegal *	solar, grid, stoves	04/09	03/19	09/19	16,701	17,201 ¹⁸	1,765,000	1,765,000
Tanzania *	stoves, solar-RBF	12/12	03/19	09/20	5,660	8,520	590,000	950,000
Uganda *	stoves, solar, grid	04/09	02/19	09/19	12,250 ¹⁹	11,900	707,800	838,000
RBF BA, KE, RW, TA, UG**	off-grid solar	03/15	06/19	09/19	4,110	4,110	1,071,546	1,071,546
RBF Mo, UG, SSA**	grid densification	03/15	06/19	09/19	4,421	4,421	290,000	290,000
RBF Ke, TA, UG	biogas	03/15	06/19	09/19	2,140	2,140	47,262	47,262

*: including "transitional funding" and/or extension until September 2019 for non RBF project

** : Extension of RBF component/ project until 09/2019 formally approved, actual extension subject to DFID's consent

¹⁴ The Bangladesh RBF project was not up- or downscaled but the technology changed from picoPV to energy efficient stoves

¹⁵ Including up to EUR 468,041 contribution of EU to ProCEAO Benin.

¹⁶ This includes EUR 947,000 from EU for ProCEAO regional management and implementation in Burkina Faso.

¹⁷ Transitional funding also to cover continuation of stove components in Cambodia and perspective in Laos

¹⁸ Including EU Cofinancing budget: PASES up to EUR 2,370,000, ProCEAO Senegal up to EUR 531,354.

¹⁹ EUR 500,000 had been subject to availability of EnDev Global funds.

Table C.5: Ongoing EnDev sector development activities *without changes*.

Countries	Title	Budget EUR in 1,000
Bangladesh, Ghana, Kenya, Uganda	Cooking sector support and coordination	2,000 ²⁰

Table C.6: Special country activities in the context of refugees and stabilisation in fragile environments.

Countries	Activities	Budget EUR in 1,000
Kenya, Somalia, Uganda ²¹		1,100
Kenya	stoves, picoPV	650
Somalia	grid, solar street light	350
Uganda ²²	stoves, picoPV	100
Uganda	stoves, picoPV	300 ²³
Uganda	stoves, picoPV	300 ²⁴
Mali	solar street light	255
Tanzania	stoves, picoPV	1,600 ²⁵

Table C.7: Innovation Fund under EnDev 2

Country	Activities	Project duration		Funding
		start	end	in EUR 1,000
Bangladesh	SHS, micro-grids	09/18	09/20	282
Madagascar	stoves	09/18	09/20	277
Mali	Pico PV, solar	09/18	09/20	197
Mozambique	PUE	09/18	09/20	400

²⁰ 1,900,000 earmarked RVO and 100,000 directly implemented by RVO

²¹ Soft Earmarking Norad

²² 100,000 of Soft Earmarking Norad (addendum 4+5), provided to Uganda

²³ planned under bilateral BMZ programme (DFID)

²⁴ 300,000 of the HQ Budget (RVO-share)

²⁵ planned under bilateral BMZ project

C.4 Review and consolidation of the RBF Facility

In June 2018, the Results Based Financing (RBF) Facility passed the 2.0 million people milestone and is now providing clean energy access to more than 2.1 million people.

The consolidation of the RBF portfolio in 2018 as agreed with DFID is starting to take shape: The RBF projects in Ethiopia and Vietnam were closed in June and August of this year respectively. Three additional projects will phase out by the end of 2018 and are on track in doing so: Peru, Bangladesh and the Mekong project. This will bring the total RBF project portfolio down to 12 projects in 2019.

In June, DFID informed EnDev about the decision to extend the duration of the RBF Facility from December 2019 to December 2020. For now, however, this extension will only be applicable to two projects: the solar project in Tanzania implemented by SNV and the mini-grid project in Rwanda implemented by GIZ. For Tanzania, this extension will entail an up-scaling of EUR 2.67 million, while in Rwanda the extension will primarily enable the realization of several additional mini-grid projects in the pipeline. Annex E4 describes both project revisions in more detail.

Formally, the duration of all RBF projects currently scheduled to close in June 2019 has also been extended to September 2019, as indicated in the tables in section C3. However, the actual extension of individual projects will be subject to DFID's consent. This agreement will apply to the following RBF projects: Benin and Rwanda solar from Round 1, Kenya (picoPV, improved cookstoves, and mini-grids) and Nepal from Round 2, and the Bangladesh and East Africa solar appliance project, the East Africa biogas project, the Grid Challenge Fund, and Malawi from Round 3.

More information on the lessons learned from the first projects phasing out and EnDev's strategic advancements in developing results-based approaches will be shared in the Progress Report 2018.

“EnDev yé anw bô dibila”

EnDev made us come out of the
darkness



Trained technicians who maintain solar systems are key for off-grid areas in Mali

Some of the key players of EnDev's activities in Mali are the local private operators assuring the delegated management of solar systems in rural communes; areas, where many others do not go. Moussa Coulibaly (pictured, on the left) is one of these operators in a rural area.

“When we started the EnDev project in 2008, there was no electricity in our villages, no solar systems – there was nothing. EnDev trained me to install and maintain solar systems. Being a certified electrician, the communes gave me confidence in my work. My fellow operators and I learnt about photovoltaic systems, marketing concepts and business management. What made the difference is that the project stayed with us. They not only facilitated but also checked the first installations that we did, and our management.”

“It was not easy at first but thanks to the support of EnDev, I am independent today. I can take care of my family, I employ 15 young people and I trained several technicians that are self-employed now. Solar energy is developing in Mali. We were the pioneers, me and the other local operators. In some way we still are, because very few installations in rural areas work as well as ours. This is unfortunate but I am confident that it will change, we have positive experience and access to electricity is very important for development.”



A UP mumve

UP should hear this

Mumkachedwa kwani mumve

where were you all this time

Ndalama zikativuta mumve

we were struggling to find money

Mukachedwa kwani mumve

where were you all this time

Umphawi ukativuta mumve

we were struggling with poverty

Stove production offers job perspectives and progress in rural Malawi

As you approach the Stove Production Group (SPG) in Demula, Mulanje district, you hear the words of a song drifting across the fresh mountain air. This song is an expression of gratitude by SPG members to EnDev Malawi's implementing partner United Purpose (UP) for carrying out their work in this region.

Established in 2004 under the GIZ funded PRoBEC project, Demula SPG now has 34 members, of which are 32 women, from Demula village in the southern part of Malawi. After saturating the local market and struggling to maintain sales, United Purpose started supplying stoves from Demula SPG to EnDev's RBF project, targeting ultra-poor and labour constrained households in eight districts in southern Malawi.

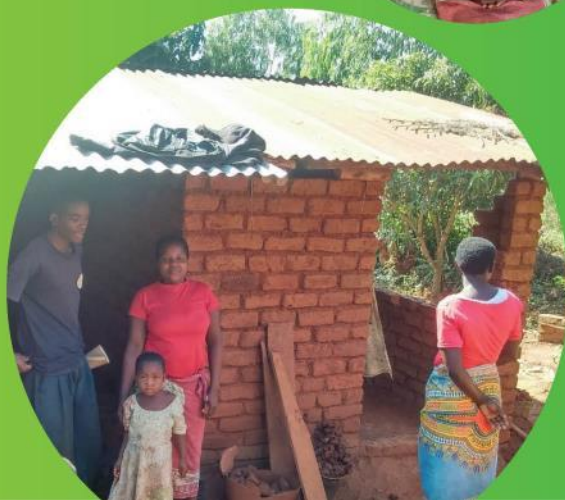
Mulanje is one of the districts where land ownership is a particular issue due to the large tea estates, which own most of the arable land in the area. Therefore, crop production is typically on a very small scale and many people are not food secure. However, this is no longer an issue for Demula SPG members, as almost all of them can now afford additional bags of maize.

"See what I have achieved? I can afford all these thanks to this project," smiled Linley Makupe (right), the chairperson of the group. Linley plastered and painted her house, bought two mobile phones, a bicycle, blankets and as well as kitchen utensils. Above all, she supports her family with rent, food, school fees and any other necessities.

Fellow SPG member Friday Chimwaza (bottom left), father of four children, also benefits from the stove production. The 33-year-old bought household items, a power back-up system, and ten bags of maize for his family. He also extended his house to make space for a larger stove production and storage.

The SPG group has produced more than 10,000 stoves as of 2017. Three quarters of these stoves have already been bought by UP under the RBF project, generating an income of MWK 4, 875, 000.00 (EUR 5,750).

©Photos (all except bottom right): United Purpose/Mayamiko Minofu



D. Thematic update

D.1 EnDev's activities in the context of displacement and stabilisation in fragile environments

In this context EnDev works from its core expertise, i.e. working at grassroots level and fostering markets for energy services by supporting locally active private and public actors. EnDev's main approach is to support the private sector already active in the nearby local market to invest and expand their business and delivery chains into refugee and host community areas. Importantly, next to the refugees, EnDev also includes host communities in establishing private production and sales structures for energy access services. EnDev support consists of a mix of capacity development, financial support, awareness raising, advocacy and monitoring.

The idea behind this concept is to test if sustainable energy services based on market mechanisms also apply in the field of humanitarian assistance. This approach aims to bridge the gap between humanitarian assistance and development cooperation: While traditional humanitarian assistance mostly bases on short-term subsidies and give-aways, development cooperation seeks to establish sustainable structures together with partners in the countries. Being aware, that parts of the very vulnerable population can however not be reached on a purely commercial basis, EnDev explores to find solutions to overcome the affordability as well as other gaps. In Kenya, Uganda and Tanzania interventions focus on complementing humanitarian assistance actors with market based solutions for energy access, contributing to a transition to long-term development. EnDev moreover also works in fragile contexts in Somalia and Mali, contributing to an increased stability situation through the provision of electricity infrastructure to the local population.

Below a short overview of the ongoing activities in this context is provided. It seems plausible that market based approaches can successfully contribute to the energy agenda in refugee settings. A 100% commercial approach is however unlikely. Penetration rates on the bases of purely commercial sales will not go into depths of the camps (and host) populations. Social/financial safety nets are indispensable if the real masses within the target population are to be reached. In Kenya EnDev is exploring such humanitarian-development combinations. Also in post-conflict areas (Somalia) private structures are available that can be strengthened to play a role on an energy access agenda. EnDev may also play a valuable role in the energy provision of social institutions and infrastructure. In both Uganda and Kenya EnDev facilitates, through the building of local capacity, the installation of institutional stoves at schools and clinics, whereas in Mali (Gao) EnDev 's activities in street lighting point to high impacts in social and economic fields, and in contributing to an increased stability in the area.

Where appropriate, EnDev proposes to include refugee-related interventions in regular country projects and enable the current pilots to extend operations beyond the pilot phase. At the same time, EnDev suggests to keep a special "displacement and stabilisation" window in the next EnDev phase, taking into account the lessons learned in the pilots, expand into new countries, and ambitiously explore partnering with humanitarian actors.

EnDev's progress in Kakuma camp in Northern Kenya seems to confirm the paradigm that market based approaches can work in refugee/host community environments too. The project supports companies selling energy access services elsewhere in Kenya to expand their businesses in the challenging environment of Kakuma. EnDev supports the companies through RBF and with promotion and awareness raising activities in the camps, addressing the supply and the demand side of the markets at the same time. EnDev partners with 8 private Kenyan companies that meanwhile partially have opened their own shops/kiosks in the host community and are selling to refugees and host communities alike. Consumer financing options applied are quite the same as in "regular" markets for PV and cook stoves/fuels, including PAYGO and direct cash sales. Until September 2018 some 16.000 people were reached, with 1.418 solar home systems and 1.239 (most advanced, especially bio-ethanol, and briquette) cookstoves sold, in roughly half a year. Although this is quite an encouraging

result it also illustrates the main challenge in the market; the low income levels of the camp (as well as poor host community) population, aggravated by the ban for refugees to work in the host community. To mitigate the project unfolds a two tier strategy; 1. Bringing down the costs for stoves by setting up a local –artisanal- stove production unit (refugee and host community (20 staff) operated), 2. Engaging with UNHCR and WFP in the widening of Cash Based Incentives (so far only used for food and shelter) to refugees to include cash for energy services. In the coming months this will be further negotiated. Besides household energy the EnDev-Kakuma project, in cooperation with WFP, has engaged in institutional cooking, providing or restoring improved institutional cookstoves through locally trained (youth) artisans for all 24 primary schools in Kakuma.

EnDev has also extended its Kenya RBF Mini-Grid project to Kalobeije camp in Kakuma with the selection of a private company constructing two MG's, one in the camp, one in the host community to serve mainly businesses in the areas. Households and institutions may be connected too, but this depends on the overall feasibility of the project, influenced by abilities to pay, and the available donor investment funds (currently EnDev anticipates 80% capital subsidy through RBF).

In Uganda and in Tanzania camps similar activities are underway or planned. In Uganda, after a thorough assessment of the energy situation in and around the camps a number of pilot interventions are implemented to determine the most successful way forward. In Rhino and Imvepi camps local distribution structures are being build through the establishment of 2 energy-kiosks selling solar and cook stoves products as well as offering a number of energy services like phone charging, printing, and cool drinks. In addition local vendors of energy products and local –artisanal- stove producers are trained. These supply side activities are again complemented with awareness raising and promotion campaigns. Like in Kenya, the Uganda project engages in the building of institutional stoves on the explicit request of the humanitarian players (in this case UNHCR), confirming the huge need for reduction of fuel costs in social institutions. The pilot project will be completed towards the end of 2018, where an evaluation of the results and most promising options will determine the most promising way forward.

In Tanzania, where a bigger intervention (3M€ German co-funding) is commissioned, implementation awaits formal agreement between GoT and GIZ (implementation agreement) that was delayed because of the country's political decision to withdraw from the Comprehensive Refugee Response Framework (CRRF) early 2018. While awaiting this signature the ongoing EnDev-RBF activities in Tanzania engaging stoves producers and solar retailers are already expanded to host communities around the Kigoma camps. Market assessments are underway and indicate the need to increase the required RBF incentives beyond the current levels because of the remoteness and relatively new establishment of the camps. In addition, community funding incentives aim to facilitate forestation activities in host communities.

In Ethiopia EnDev cooperates with the Dutch NGO ZOA for a joint construction of 3 briquetting plants. Raw material for briquettes will be sourced from agricultural residues such as sesame straw and coffee husk. For this cooperation, EnDev provides hardware, technical training and installation, while ZOA covers the costs for construction of the production hall as well as for access to electricity and organizes sales of stoves and briquettes to refugee camps. This is foreseen to be a commercial approach and it is planned to engage cooperatives and unions to become owners of the plants.

Next to refugee camps, EnDev engages in post-conflict areas and countries where local communities often absorb large amounts of internally displaced people (IDP) and/or where local government and public structures are very weak and vulnerable. In such unstable environments a reliably functioning energy-infrastructure contributes not only to social wellbeing and economic development, but contributes also to security and the reestablishment of trust in public bodies. Through NIS Foundation, EnDev successfully installed 72 solar-powered streetlights along 6 key-roads in Gao, Northern Mali. Once installed, the qualitative impacts of the project were immediately apparent: Shops, restaurants, stores, welding workshops, sewing workshops, dressers, bars, drugstores and the like were observed being open in evening hours. The number of people on the street after nightfall had increased directly because of the streetlight installation. Discussions with locals revealed that, due to a higher feeling of

safety and the longer opening hours, economic activity increased as both, shops and consumers, benefitted from the increase. The project entailed the construction and commissioning of the lights, combined with a 6 months maintenance contract for a private firm. After this initial period the Malian Ministry of Energy has agreed to, through the Regional Director of Energy, take over the maintenance of the installations. As this 6 months period expires in September 2018 EnDev will monitor the continued maintenance and intervene where necessary to further strengthen local governance structures. Being aware that a sustainable solution for maintenance is the crucial element in such an intervention, this approach could be well repeated/expanded as preliminary observations indicate a high social and economic impact.

Also through NIS, EnDev is hybridizing (and expanding capacity of) a diesel mini-grid with solar PV in Luuq town in Somalia (Jubbaland). In negotiations with the local utility (a PPP between municipal government and a private operator) NIS/EnDev it was agreed to slash kWh prices by 50% for existing customers, and to connect -under favourable conditions- additional (poor) customers in Luuq town as well as in nearby IDP camps, in return for EnDev's investment in the solar installation. At the end of this reporting period, procurement has been concluded and commissioning is foreseen before end of 2018. Remarkably, EnDev received no less than 7 bids from local but also from RSA, Kenyan and European companies indicating the appetite from solar companies to operate in even high-risk areas. After commissioning EnDev will monitor the performance of the installation and evaluate the potential for replication of this concept.

D.2 Innovation fund

As EnDev's primary approach follows a financial benchmarking of providing sustainable access to modern energy services, there is a clear tendency and incentive to build on proven technologies and well-tested intervention logics. Innovation as such is not part of mainstream EnDev. Although innovative concepts were explored on the sidelines of regular implementation, the Innovation Fund now provides an official innovation track.

Initial conceptualization and first call

The objective of the Innovation Fund is to develop, test, and evaluate new approaches to selected persistent challenges that projects face in implementation. The Innovation Fund is meant to be a springboard for testing selected innovative approaches tackling specific challenges which – if successful – have the potential for further roll-out in EnDev projects worldwide. In 2018, focal themes of the Innovation Fund are therefore energy access in productive use and social infrastructure, as a driver to economic and social development respectively, as well as responsible handling of electronic waste ("e-waste") from project interventions (mainly from, but not limited to, the off-grid sector). Innovation in the EnDev context should be in line by the following key characteristics:

- **Approach:** While application of innovative technology may be part of a project, particularly innovative *approaches* for facilitating access to energy services or handling e-waste are sought.
- **New business models:** Even though the concept of markets for energy access in relation to productive use, social infrastructure, or handling e-waste may be less clear than for household energy access, ideas should contain an initial analysis of relevant "market barriers" and how they would be addressed.
- **Sustainability:** Projects aiming at energy access for productive use should be based on private entrepreneurship and have a profitable business case underpinning their long-term financial sustainability. Also for projects aiming at energy access for social infrastructure, long-term (financial) sustainability should be clear, while achieving such sustainability might in fact be a specific objective of the project. Likewise, projects addressing the responsible handling of e-waste should result in an autonomous continuation of activities after the ending of the project.

- **Replication potential:** Projects should fit the “bigger picture”; results in principle should be scalable and replicable in country and/or across countries.
- **Interlinkage:** Projects should be aimed at supporting existing EnDev interventions / be placed in existing EnDev intervention zones.

The Innovation Fund was structured in three main steps:

- **Call for proposals:** The Innovation Fund followed an open call for proposals to all EnDev projects and all implementing partners, initial ideas were submitted in a pre-defined concept note format. In total, 19 concept notes were submitted by ADES, Hivos, GIZ, NIS, and SNV.
- **Evaluation and pre-selection:** Concept notes were reviewed by a selection committee which consisted of EnDev management and an external reviewer. The review followed an assessment grid and scoring system that resulted in a ranking of concept notes. The best ranked concept notes were requested to develop and submit full proposals according to a pre-defined format. Of the 19 concept notes, nine were selected and asked to submit full proposals.
- **Selection and awarding:** After submission, full proposals were evaluated by the selection committee. The review followed a more detailed assessment grid and scoring system that resulted in a ranking of proposals. The four best ranked proposals were selected for implementation, awarding is ongoing.

Selected projects

The selected proposals represent all themes of the call, i.e. productive use (Riksha charging through swarm grids in Bangladesh, and utility credit for productive use appliances in Mozambique), sustainability of social infrastructure (school cooking in Madagascar), and e-waste (prolonging life span of appliances through repair and maintenance structures in Mali, with additional e-waste components in the Bangladesh and Mozambique proposals). Projects will be implemented in the next 18-24 months during which the results will be documented and lessons learnt will be shared. A brief overview of selected projects is provided below.

- **Riksha charging through swarm grids in Bangladesh (implementation via GIZ):** This projects builds on previous successful efforts of having established a first set of swarm electrification microgrids. Previous problems of cooperative models were addressed through an interconnection of multiple solar home systems with an automated billing infrastructure based on mobile money. This allows for a new and more robust form of community participation and grid ownership. The project aims to further expand this concept by developed a solar PV peer-to-peer grid infrastructure, allowing for a seamless integration of 1M+ battery-run rickshaws in rural and largely off-grid areas (more than 1 million in Bangladesh) in need of a more affordable, safe and convenient way to charge their vehicles, as well as financing for expensive batteries/and battery replacement strategies. The project aims at developing a modified peer-to-peer model for e-bike charging fostering communal rural economic development.
- **School cooking in Madagascar (implementation via ADES):** The project aims to design, test, and install customized energy-saving cooking facilities – integrating different technologies – to school kitchens, relieving the institutional budgets and improving working conditions. The optimized combination of solar and improved biomass cookstoves plus good ventilation will allow to reach a measurable reduction of >50% of the regular consumption of firewood and charcoal, and a strong reduction of the kitchen air pollution. The objective is to create a replicable model for combining different technologies like solar cookers with improved cookstoves (ICS) as part of an improved kitchen concept for social institutions.
- **Repair and recycling of (pico)PV solar products Mali (implementation via GIZ):** The project builds and expands ongoing EnDev activities with a focus on high quality (pico)PV products. The main objective is to reduce e-waste. This is done by contributing to extending the lifetime of products (repair) and by building initial stakeholder relationships for sound

recycling systems. The project will work on two levels: On the one hand, Points-of-sales (POS) in rural areas are supported to expand their after-sales services, i.e. to collect and repair (pico)PV products. The objective is that rural operators at these POS will be able to take back products, to identify technical problems and handle these by either repairing or sending products elsewhere for further treatment. While the first intervention is building on a rural network for improved after-sales services, it will be necessary to also develop business opportunities for recycling. The so-called “e-waste PV challenge” is meant to be a model to communicate about e-waste in an appealing way. The approach uses a competition launched through an open call on national level and aims to invite young entrepreneurs with ideas on treatment of e-waste (with a focus on (pico)PV). The business ideas will be evaluated according to criteria such as product and market knowledge, robustness of the proposed e-waste recycling approach, investment readiness, etc.

- **Productive use of energy in Mozambique (implementation via GIZ):** The project aims at tackling the barrier of end-consumer financing by making use of a prepaid energy sales platform from the Mozambican utility EDM to create an instalment-based retail mechanism for the promotion of energy efficient appliances. The offered product range will include specialized profession kits, e.g. a barber kit, which will contain basic necessary equipment which enables to offer income generating services and thus immediately leads to productive use of energy. To identify eligible EDM clients, a credit-score tool will be developed based on historic data of energy consumption and client track record. The credit-score tool will allow creating financial track records of beneficiaries, which otherwise would not have the chance to demonstrate their credit worthiness. The proposed project will improve access to finance for small business start-ups and will contribute to financial inclusion. Furthermore, through a gender associated risk coverage this project aims at improved female financial inclusion and improved business opportunities for women. Additionally, to ensure the replacement of inefficient appliances an e-waste collection infrastructure will be set up, in cooperation with existent local recycle companies/associations using an innovative incentive-based approach for the customers.

First conclusions from the call

The competitive process of selection was well received and delivered the expected results. Concept notes as well as full proposals were of good quality. Nevertheless, from the perspective of the selection committee, the level of out-of-the-box innovation was assessed to be modest. This most probably originated from not explicitly encouraging purely experimental approaches as well as from the criteria asking for links with ongoing EnDev projects. Therefore, criteria will be reviewed to stimulate innovation in future calls as much as possible. An additional conclusion is also to make the process as such more interactive and innovative, e.g. to include elements of joint concept development (innovation lab, design thinking).

Bundling energy services and seasonal payment schemes for sustainable rural development in the Rwandan off-grid energy sector

The international NGO One Acre Fund (OAF) has been helping farmers in Rwanda increase their income and improve their livelihoods since 2007. Services include financing the distribution of improved farm inputs and solar products, farm trainings and market assistance.

OAF's business model is tied closely to the harvest cycles, which determines the income of farmers. The organisation sells products to their beneficiaries during the two annual harvest cycles, which has allowed them to generate economies of scales and reduce prices. Payment plans for solar home systems are also tied to the farming calendar. Systems are paid off in four instalments coinciding with the end of the harvest seasons over two years. Customers can pay at any point within the 6-month period. As such, OAF has adapted its flexible payment plan to customers' cash flows, making it easier for farmers like Cyprien Nyagasaza to benefit from solar lighting.

Cyprien has been part of the OAF cooperative Tubura in the Nyagatare district since January 2018 and acquired his first solar system with the help of OAF in February 2018. Before purchasing the 3-light system, the family of 8 was relying on weak battery-run torches for lighting. Cyprien had been wanting to get better lighting for evening activities, including cooking, reading and studying, for a while, but was unable to afford the payment plans offered by other providers. "Thanks to the seasonal payment plan, I can pay when I have money and can still keep the electricity on. Now, we have good lighting and save time as we can charge our phones at home rather than going to town twice every week," Cyprien says. The family has taken the first step on the energy ladder. Their positive experience has motivated them to upgrade their system in future to enable the use of appliances such as a TV.

Through its business model, OAF has helped farmers like Cyprien improve their quality of life and achieve sustainable increases in income. It has become one of the largest solar lighting providers in East Africa. OAF joined the EnDev Rwanda RBF in 2017, and EnDev has supported more than 30,000 OAF solar lighting sales. Participating in the RBF has allowed OAF to better manage the volatility of the market, promote financial growth and thus serve more beneficiaries.

©Photo: One Acre Fund





Energy-efficient solar TV in Western Kenya: local news and safety from the storm

Refah Khatiali (pictured), her husband and four children share a two-room mud house just meters from the banks of a gently winding river, nestled among fields of sorghum and acacia trees. East Kolwa in Western Kenya is a land of abundant harvests and breathtaking sunsets. But life here isn't easy. Roads are few, and the population is sparse. This is because Khatiali lives on a floodplain, and several times a year the river that flows through it turns deadly. When it does, people can be trapped in their houses for days. The narrow footpaths become impassible.

Khatiali recalls that during the most recent rains, the family awoke to find themselves knee deep in water, and had to evacuate in the middle of the night. But her most pressing concern is for her three children, the youngest of whom is a one and a half year-old girl. "The water covers this path", she says, pointing just outside her door. "When she tries to cross to the other side the water can easily take her. People die of drowning, especially children."

Khatiali owns a small kiosk in a nearby town, selling oil, soap, tea and fruit; her husband works as a driver. For years she had been looking for a way to keep her children safely inside, particularly while both parents are out. She had never owned a TV, and almost no one in the area is connected to the grid. "People are afraid of electricity", she explains, because of the risk of electrocution during floods.

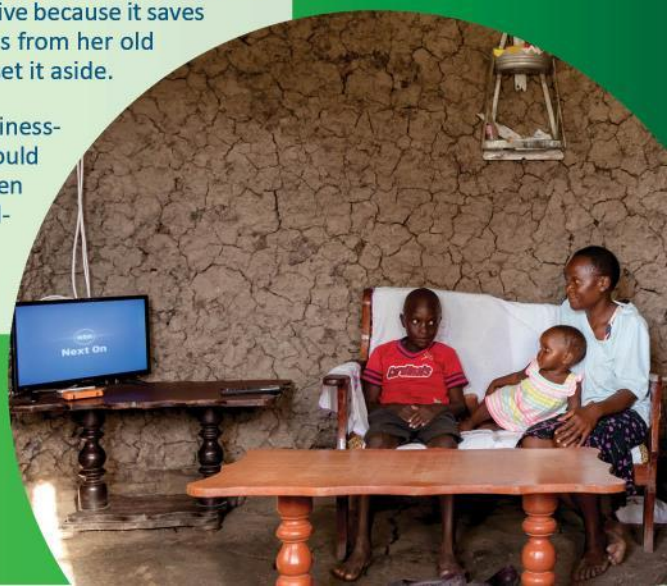
Then one day she saw a solar TV at a neighbour's house, and decided this was the solution to her problem. She was impressed by how long it held its charge compared to other solar TVs. "This one you can watch the whole day", she says. It took her two months to save enough for the KSH 5,500 (EUR 46) down payment, and now she repays KSH 60 (EUR 0.5) a day.

For Khatiali, it's worth it. "If the kids don't have a TV, they will have to go outside to play", she explains. "It's dangerous." Plus, they learn things like spelling and math from educational programmes, and the whole family sits down to watch the news together every night.

The Mobisol package came with a radio and three lights, enough for each room of the house with a security light out front. Khatiali's neighbours were astonished to see she could afford it. "They thought it was expensive," she says. "I told them it's not expensive because it saves them buying kerosene and such things." Khatiali also knew the fumes from her old kerosene lantern were bad for the children, and she was relieved to set it aside.

Her TV has a built-in battery, and she's happy with it. But, as a business-woman, she would like someday to buy an external battery that could power other appliances, such as an iron or electric clippers. "I can open a barber shop near the school", says Khatiali, "and I can cut the children's hair."

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From unskilled labourer to social entrepreneur

Bhume Lama is a successful smoke hood manufacturer as well as entrepreneur and trainer. Originally from Rasuwa district, the 42-year-old used to work as a daily wage laborer with very low and unstable income. He had a hard time nourishing his 11-member family and was looking for a better, more secure job. In 2006, he got in contact with Practical Action Nepal, today's implementing partner of EnDev Nepal. Practical Action supported local entrepreneurs to start a business of indoor smoke alleviation devices. Bhume saw potential in setting up a hood stove business, so he started his own smoke hood manufacturing and installation business in Rasuwa. However, his business was not an instant success due to low demand and low volume of transactions in the beginning. Through the introduction of EnDev's RBF project, he was able to expand his business to the neighbouring districts of Nuwakot, Dhading and Gorkha. The geographic expansion helped increase the demand for smoke-free cookstoves. With a rising stove demand, he was able to gradually sell more, thus earn a higher income. "This business has given me recognition", he said and he feels great satisfaction when his customers thank him for making their kitchens smoke-free. He is proud with his business as it is not only reliable income, but he believes this is social work, which brings benefit for people's health, income and the environment.

With his expertise in smoke hoods, Bhume now trains potential manufacturers from other districts. He has taught more than 80 craftsmen to fabricate hood stoves. "Mr. Lama knows all problems and addresses the concerns of the users. We feel good to be trained by him", explains one participant.



Rural co-operatives manage their own biomass energy supply for brown sugar production in Honduras

The farmer Silvestre Orellana and his wife have two sons and four daughters (top right). They live in Suntulin of San Marcos de Caiquin. He is a member of the Co-operative New Horizons Limited (COMINUHL), which counts twenty community organisations with 340 farmer families. Asked for the benefits of the improved kilns he states, "Before, we were using large kilns with metal sheets and wooden frames. The old kiln consumed too much firewood. We made one, and sometimes two cookings per day. We started at 4 or 5 a.m. and finished at 9 p.m., firing 8 to 10 loads of firewood (400 to 500 logs) per cooking, which gave us 17 to 18 sugar blocks (1kg) per cooking."

Silvestre explains the advantages of the production and the new kiln, "The sugar cooks much more evenly. We get a block of light colour. Before, it was darker. And the sugar is sweeter than before. The new, small kiln is much faster in heating the cane juice. We can do three to four cookings a day, because a cooking now only takes two to three hours. We need much less firewood and get a lot more sugar blocks, about 40 blocks per cooking. Most firing is done with the bagasse of the sugar cane and we only use one load of firewood (50 logs) for igniting the kiln."

In the hilly subtropics of Honduras sugarcane is traditionally produced and processed by small farmers, organised in small cooperatives or associations. The sugarcane is planted and harvested, then pressed, and the juice is boiled in pans until it starts to condense. Before the syrup gets solid it is poured into moulds. The solid crude brown sugar is sold in cylindrical blocks. The boiling process is traditionally fuelled by firewood and the wood consumption is very high during the harvesting season.

More than 50 improved and cleaner kilns for the processing of sugarcane have been installed by MAPANCE (Association of Municipalities of the Celaque National Park) with producer organisations. The improvements consisted in substituting firewood by bagasse (pressed sugar cane stems), the use of improved evaporator pans, as well as high chimneys, which direct the smoke out of reach of the workers operating the kilns. EnDev financed the new improved evaporator pans and contributed with specialised technical assistance through the University of Vermont. MAPANCE organised, directed and supervised the project activities with its technical staff, and the producer organisations constructed the kilns with their members, contributing with local labour and local materials.

An impact study conducted by EnDev over six processing centres, interviewing 82 farmers, prove that the production process is accelerated, that the quantities are increased and that the quality of the product is improved. Before, an average of 78 sugar blocks was produced per day with the traditional kiln. With the improved kiln, the average sales have increased by 201%, improving directly the incomes of the farmer families.



Abbreviations

ABC	advanced biomass cookstoves
ADES	Association pour le Développement de l'Energie Solaire, Switzerland
AEPC	Alternative Energy Promotion Centre, Nepal
AISER	the Interprofessional Association of Renewable Energy Specialists
ALCASP	ADB supported programme in Vietnam, Biogas
ANADER	Agency for the Development of Renewable Energy, Benin
ASS	After Sales Service
AVSI	Association of Volunteers in International Service
BBF	Bangladesh Bondhu Foundation
BCE2B	Business-to-Business
BDS	business development support
BIRU	Biogas RUma Indonesian for Household Biogas
BLEENS	solar cookers
BMZ	the German Federal Ministry for Economic Cooperation and Development
BO	beneficiary organisations
CAP	Country Action Plan, Bangladesh
CCAK	Clean Cookstoves Association of Kenya
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CES	cooking energy systems approach
CLASP	Collaborative Labeling and Appliance Standard Program
CPO	Construction Partner Organisations
CRRF	Comprehensive Refugee Response Framework
CSI	Credit Sanctioning Incentive
DEZA / SDC	the Swiss Agency for Development and Cooperation
DFID	the UK Department for International Development
DJEBTKE	Directorate General for New and Renewable Energy and Energy Conservation
DRC	Democratic Republic of the Congo
EAC	East African Community
EAMD	Energy Access Market Development Scorecards
EDCL	Energy Development Company Limited
EDM	Electricidade de Moçambique/ Energy Public Utility, Mozambique
EnDev	Energising Development programme
ENUFF	Enhancing Nutrition of Upland Farming Families programme
EPC	engineering, procurement, construction
ESMAP	Energy Sector Management Assistance Program
FASERT	Fund for Sustainable Access to Thermal Energy
FASERTE	Fund for Sustainable Access to Renewable Energies and Efficient Technologies

FDL	Nicaraguan Local Development Fund
FIDECOP	Portable Wood-Burning Cookstoves Innovation and Development Fund
FOCAEP	Central American Fund for Access to Sustainable Energy and Poverty Reduction
FONCODES	National Cooperation Fund for Development, Peru
GACC	Global Alliance for Clean Cookstoves
GCF	Green Climate Fund
GHACCO	Ghanaian Alliance for Clean Cooking
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GOGLA	Global Off-Grid Lighting Association
GOI	Government of Indonesia
GTF	Global Tracking Framework
GTF	Global Tracking Framework
HAP	Household Air Pollution
HDI	Global Human Development Index
HEP	national household energy platform, Bangladesh
HH	households
HIVOS	Humanistisch Instituut voor Ontwikkelingssamenwerking
HLPF	High-level Political Forum on Sustainable Development
IAP	indoor air pollution
ICF	Conservación y Desarrollo Forestal, Honduras
ICS	improved cookstove
IDCOL	Infrastructure Development Company Limited
IFC	International Finance Cooperation
IICA	Inter-American Institute for Cooperation on Agriculture
iQC	independent quality control
IVA	independent verification agent
IWME	improved water mills electrification
KEPSA	Kenya Private Sector Alliance
KESDM	Ministry of Energy and Mineral Resources, Indonesia
KOFIH	Korea Foundation for International Healthcare
KOSAP	Kenya Off Grid Solar Programme
KPI	key performance indicator
KPT	kitchen performance test
LDC	least developed countries
LEAP	Liberia Energy Access Practitioner Network
LMEs	last mile entrepreneurs
MARD	Ministry of the Agriculture and Rural Development, Vietnam
MCA	Millennium Challenge Account Benin
MCC	Millennium Challenge Corporation

MEM	Ministerio de Energia y Minas, Nicaragua
MEMD	Ministry of Energy and Mineral Development, Uganda
MEMR	Ministry of Energy and Mineral Resources, Indonesia
MESPT	Micro Enterprise Support Programme Trust, Kenya
MFA / DGIS	Netherlands Ministry of Foreign Affairs Directorate-General for International Cooperation
MFA-NOR	Norwegian Ministry of Foreign Affairs
MFI	micro finance institution
MHP	micro hydropower
MIDIS	Ministry of Development and Social Inclusion, Peru
MINEM	Ministry of Energy and Mines
MININFRA	Ministry of Infrastructure, Rwanda
MME	Ministry of Mines and Energy, Cambodia
MoEF	Ministry of Environments and Forests, Bangladesh
MOEn	Ministry of Energy, Ghana
MoEP	Ministry of Energy and Petroleum, Kenya
MoST	Ministry of Science and Technology, Laos
MoU	Memorandum of Understanding
MoWIE	Ministry of Water, Irrigation and Energy, Ethiopia
MPE	Ministry of Energy, Senegal
MTE	mid-term evaluation
MTF	Multi-Tier Framework
MZM	Mozambican Metical
NACEUN	National Association of Community Electricity Users Nepal
NAMA	Nationally Appropriate Mitigation Actions
NAPE	Nutrition and Access to Primary Education
NCF	Nordic Climate Fund
NDCs	Nationally Determined Contributions
NEA	Nepal Electricity Authority
NEP	National Electrification Plan, Rwanda
NIS	Nordic International Support Foundation
O&M	operation and maintainance
OAF	One Acre Fund, Rwanda
ODA	Official Development Assistance
OECD DAC	Development Assistance Committee of the Organisation for Economic Co-operation and Development
OGAC	Off-Grid Advisory Committee
PAS	Project Analysis Sheets
PAYG	Pay-As-You-Go
PDA	bilateral agricultural programme of GIZ in Burkina Faso

PHC	Primary Health Centres
picoPV	pico photo voltaic
PO	Partner organisations
POS	Points-of-sales
PPP	public private partnership
ProCEAO	Programme pour l’Energie de Cuisson économique en Afrique de l’Ouest/ Cooking energy in East-Africa
PU	productive use of energy
QPI	Quality Plant Incentive
RBF	results-based finance
REA	Rural Electrification Authority
REASL	Renewable Energy Association of Sierra Leone
REF	Renewable Energy Fund
REG	Rwanda Energy Group
RISE	Regulatory Indicators for Sustainable Energy
RLCCL	Latin American and Caribbean Network for Clean Cookstoves
ROGEP	Regional Off-Grid Electrification Project, World Bank Benin
RVO	Rijksdienst voor Ondernemend Nederland
SAFE	Safe Access to Fuels and Energy
SCT	social cash transfer
SDG	sustainable development goals
SEDA-E	Solar Energy Development Associations Ethiopia
SECCS	Strengthening the Enabling Environment for Ethiopia’s Clean Cooking Sector
SEforALL	Sustainable Energy for All initiative
SHS	solar home system
SI	social institutions
SIDA	the Swedish International Development Cooperation Agency
SIF	Special Initiative for Refugees (GIZ)
SME	small and medium enterprise
SNV	Stichting Nederlandse Vrijwilligers / Netherlands Development Organisation
SSHS	small solar home systems
SSIC	Student Stove Innovation Challenge, Kenya
SWH	solar water heaters
TA	technical assistance
UNACC	Uganda National Alliance for Clean Cooking
UNEP	United Nations Environment Program
UNHCR	United Nations High Commissioner for Human Rights
VAI	Vulnerability-Access Index
VAT	Value-Added Tax

VMEEA	Vice Ministry for Electricity and Renewable Energy, Bolivia
VSL	Village Savings and Loan
VWU	Vietnamese Women's Union
WHO	World Health Organization

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