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on

Energising Development – Phase 2

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Energising Development

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Contents

A. EnDev in 2014 – trends and challenges

In the last two years, the EnDev programme experienced several strategic and operational changes, such as the start of the DFID-financed RBF facility, the involvement of implementing organisations outside GIZ in the implementation, the expansion of work in fragile countries, stepping up activities to promote solar systems, and the modification of our monitoring system to make it compatible with the tier system of SE4ALL. Most of the changes are still in an early stage and will be consolidated in the coming year.

The Governing Board started in parallel a discussion about the future strategy of EnDev, considering that new donors joined the partnership, new concepts such as "Result Based Financing" were introduced into the programme and a jump of the overall budget allowed a considerable expansion of activities. The strategy discussion will continue in 2014 and will be informed by the results of a mid-term evaluation of the EnDev programme.

Programme evaluation and a new strategy for EnDev

The midterm evaluation of EnDev is planned for the first half of 2014. The results will be presented to the Governing Board meeting in April/May 2014. The main objectives of the evaluation are to analyse and assess the relevance, performance, structures, alignments, and management of the programme. The review will also serve to identify ways to improve the programme strategy. In addition, a preliminary strategy paper has been worked out (see separate document) which will be discussed during the November 2013 Governing Board and later reviewed in 2014 considering the results of the evaluation.

Consolidating new country projects and the integration of new implementing partners

In 2013, EnDev started several new activities resulting in a significant increase of the number of country projects compared to 2012 from 20 to 27. New country projects are implemented in Cambodia, Indonesia, Madagascar, Malawi, Tanzania and Vietnam. In five of the six countries, projects are not implemented by GIZ but by other international implementing organisations. In Malawi the project is mainly implemented by the local non-profit organisation MAEVE with support of GIZ.

Country	Implementing Organisation	Activity
Cambodia	SNV (Netherlands)	Biogas
Indonesia	Hivos (Netherlands)	Biogas
Madagascar	ADES (Switzerland)	Improved cookstoves
Malawi	MAEVE (Malawi)	Improved cookstoves
Tanzania	SNV (Netherlands)	Improved cookstoves, and solar lanterns
Vietnam	SNV (Netherlands)	Biogas

All new partners were acquainted with the basic principles of EnDev, especially the performance based approach, and the monitoring requirements. Results of the first reporting period demonstrate that partners took up quickly the EnDev principles (see chapter E on status of country activities). In 2014, the cooperation with the new implementation partners shall be strengthened by including the partners in the communication and knowledge management system. In addition, EnDev will be open to involve additional partners (see chapter on RBF).

Strengthening electrification activities

The focus of new and up-scaling activities in 2013 apart from the RBF facility has been on access to modern cooking and heating systems (improved cookstoves and biogas), which contribute to reduce greenhouse gas emissions and deforestation. The considerable increase of activities related to cooking was made possible by AusAID joining EnDev with a significant financial contribution to enhance an efficient use of biomass. The current funding of AusAID will end in June 2014. The current peak of cooking activities will consequently slow down gradually.

Considering that the share of electrification outcomes is still below the target of 33 %, EnDev will strengthen access to electricity in the coming year and gives preference to grid and off-grid electrification activities in the up-scaling of country activities. More than 80% of the up-scaling funds presented in this Annual Planning document are reserved for electrification.

Implementation of Result Based Financing projects

DFID's RBF approach

A significant part of new and up-scaling project activities in 2013 were based on DFID's "Results Based Financing" approach. After approval of the RBF portfolio by the Governing Board in May, preparations for implementation were made in the seven RBF projects. However, immediate implementation only took place in the biogas programme in Vietnam, where funding of the running activities was taken over by EnDev in preparation of the shift to a new RBF pilot scheme to start in 5 provinces beginning 2014.

Some delay was experienced because the GIZ contractual and legal department had to ensure that the payment of RBF incentives is not in conflict with European Union state aid regulations. Project proponents have also been dealing with many questions regarding detailed incentive designs, eligibility criteria of parties, contracts with financial institutions and the private sector, etc. Fully applying the RBF concept in practice confronts programme managers and participants with new thinking and challenges, quite different from regular implementation. To support the projects in the inception of the RBF EnDev HQ provides intensive additional support in the form of dedicated missions, phone conferences, reviews, formats, specialised internal and external consultants, etc. This comes at a cost, not only in terms of staff and financial input to the RBF process, but also in terms of implementation delay. Even with these delays, all RBF projects are on track to start implementing private sector contracts by January/February 2014.

DFID commissioned a series of analysis on the first tranche of RBF projects. They were intended to contribute to the RBF learning process and trigger reflection of project managers. They also directly fed into the preparation guidelines for the second tranche of RBF proposals that will be developed in fall of 2013. Some of the main recommendations are presented in the Annex 1. Not all of the recommendations from the analysis papers will be accommodated in the 2nd tranche, either for feasibility reasons, or because they might conflict with an essential feature of RBF, the promotion of commercial markets.

The second round for RBF proposals starts in October 2013. Next to the existing EnDev projects a limited number of NGOs (SNV, HIVOS, Practical Action and GVEP) have been be invited to participate, while cooperation of existing EnDev projects with other organisations (like WB ACCES) will be encouraged on the country level. A public online consultation/brainstorm for ideas is initiated via Energypedia. The Annual Planning 2014 update, covering the full RBF project proposals for the second round will be submitted for EnDev Governing Board approval in its spring 2014 meeting.

RBF/Payment by Results (PBR) approach of energy+

Not related to the RBF facility, EnDev has been applying different types of RBFs/PBRs in country activities since several years. They include:

- *Purchase guarantee* for certain products or certain services, whereby a fixed quantity and price is offered for a product or service in case the market does not respond to promoted products or services;
- *Performance based budget increase*, whereby projects receive additional funds if they achieve defined milestones;
- *Output-based cash transfer*, whereby manufacturers and/or dealers receive certain subsidies for each sold product or provided service.

In addition, EnDev is providing non-monetary incentives such as training and business development support to manufacturers, dealers and organisations, depending on their performance. Insofar, EnDev is using the term "result-based incentives" as it includes both monetary and non-monetary incentives. The EnDev incentive tools have been discussed with the Norwegian Energy+ team to further develop the RBF/PBR component of Energy+.

Recently the Energy+ approach was modified. Energy+ will now provide preferably Payment by Results (PBR) on a sectorial level to the governments of implementing partner countries. With some of the donors providing the required up-front financing, Energy+ will 'refinance' the program if the initial funds are put to good use and yield results. Thus, Energy+ would provide PBR for increased access from for example mini-grids and stand-alone systems, including access to improved cook-stoves and lighting based on renewable energy, by defining PBR fees for each connection achieved depending on the supplied service level (tier of access to energy). The PBR funds shall be used to refinance on-going and new projects yielding again new outcomes. The modified concept of Energy+ is basically a performance based approach, where funds are provided to the partners governments according to the performance of the projects on the ground. Thus, there is a strong linkage between EnDev activities, the policy of the Government, and Energy+ funding. EnDev will strengthen this cooperation in several Energy+ partner countries in 2014.

International discussions about access definitions and criteria

EnDev has been strongly involved in the development of the official multi-tier system to measure household electricity access of the SE4ALL initiative. The system has been applied in the last two monitoring cycles of EnDev and results are reported in the Progress Report 2012 and the present Annual Planning. In addition, EnDev will use the SE4ALL questionnaire on energy access to calculate an energy access index in a household survey in Ethiopia in 2014. EnDev will be the first programme to test the questionnaire in the field, in close communication with the World Bank SE4All team.

EnDev is also contributing to the development of a tier system for cooking technologies. The current system published in the SE4ALL tracking framework is still not fully elaborated. Four main technical dimensions are currently discussed to measure the quality of cook stoves: energy efficiency, emissions, indoor air quality, and safety. However, the defined standards for the four dimensions are not easy to measure, requiring costly equipment. Also, they are still tentative and are not reflecting well enough the complex cooking system (fuel, stove, user behaviour, cooking environment), for which local stoves are developed and used. In addition, customers in developing countries quite often prefer stoves that cook fast and are cheap. Thus, additional dimensions have been introduced such as convenience and affordability. How to combine these different dimensions is still an open question.

EnDev will develop a tier system for cooking in 2014, which shall substitute its current definition of "access to modern energy for cooking" which is solely based on a 40% reduction of specific fuel consumption in comparison to the baseline cooking technology. In parallel, EnDev will continue engaging in the international debate on the access definition, using its strong link to the users as a reference.

Promotion of high quality pico-Photovoltaic systems

EnDev and the Lighting Africa programme of the World Bank have pioneered the introduction of high quality pico PV systems since 2009. However, it took several years till these systems became more affordable and found their market. In 2013, it was estimated that sales of solar lanterns worldwide grew by 80%. It indicates that the demand for electric lighting is huge. The sharp increase in sales also cautions EnDev in its promotion strategy for pico-PV, and the additionality thereof. In some countries one might argue that pico-PV systems are coming close to commercial breakthrough, and interventions might cause distortions .This debate should however be seen in the perspective of the fact that dry-cell powered LED lanterns of low quality are even more successfully overflowing Africa. The prices of these lanterns are low, but the durability is insufficient and costs per service are high. In addition the lamps produce significant amounts of toxic waste (mainly dry cell batteries).

EnDev will pilot in 2014 different strategies to attract the attention of customers towards higher quality products and to reduce the use of toxic batteries. In those cases where EnDev provides subsidies to high quality products it will balance its market development approach with consumer protection, maximising the energy service delivered to the target group.

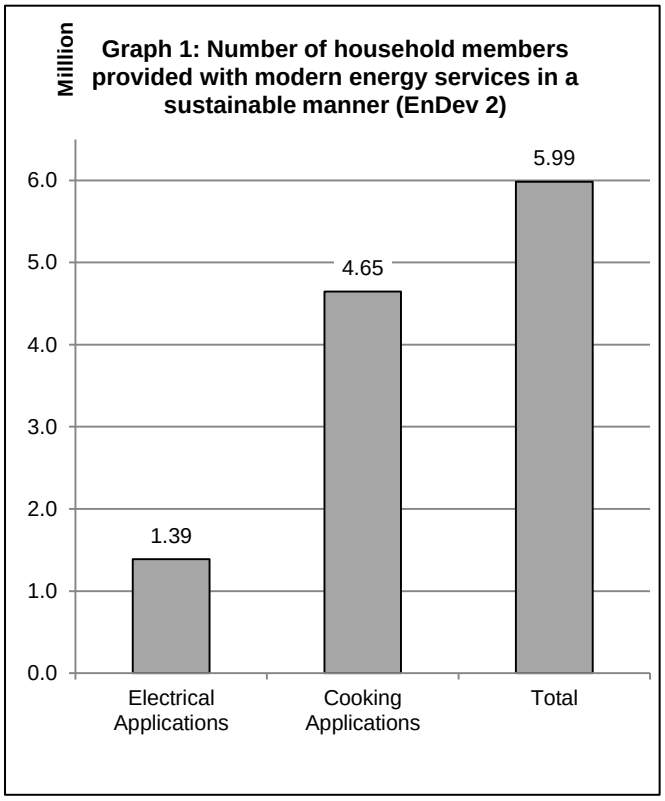
B. Overview on current status of the EnDev 2 programme

In 2013, the EnDev Partnership comprised 27 activities in 24 different countries. The focus of the programme is on African countries. Around 57% of the committed EnDev 2 funds are currently allocated to Africa.

By June 2013, EnDev 2 facilitated sustainable access to modern energy services and technologies for about **5.99 million people**. Out of these 1.39 million people (23%) were connected to the central grid or a mini-grid or became owner of a photovoltaic systems. 4.65 million (77%) are now using improved cooking technologies, such as improved firewood and charcoal stoves or biogas plants (Graph 1). In addition, **6,849 social institutions** gained access to improved cooking systems or electricity, and other forms of modern energy services and **12,498 small and medium enterprises** now have access to a modern form of energy for productive use.

These figures take into account:

- a “sustainability adjustment factor”, which takes into account that the access provided to modern energy technologies is not sustainable in all cases
- a “windfall gain factor”, considering that some households supported by EnDev would have gained access to modern energy services anyway even without support
- a “double energy factor”, which accounts for households and social institutions which already have access to modern energy services in the same category (modern cooking energy technologies or electricity).
- a “double EnDev factor”, which ensures that households benefitting from both, modern cooking energy and electricity through the EnDev programme are only counted once in the aggregate figure.



Graph 1: Number of household members provided with modern energy services in a sustainable manner (EnDev 2)

As already presented in the last Annual Planning Document, EnDev is using a tier system for defining 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.

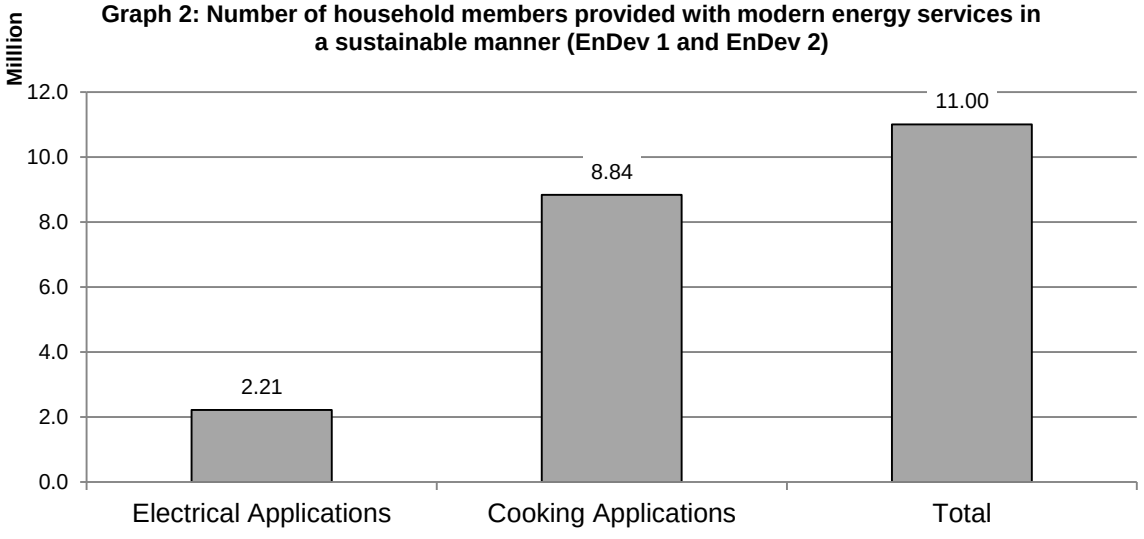
The EnDev tier system was slightly modified in the last months and now complies with the tier system of the SE4ALL tracking framework that was published in May 2013. Based on this system the EnDev electrification outcome figures in the different tiers are as follows:

Tier	Services	Typical system	No. of people
5	Tier 4 services plus use of devices typically requiring a few kilowatt like air conditioners	grid	312,828
4	Tier 3 services plus use of devices typically requiring a kilowatt like water heaters, irons	limited grid	168,482
3	Tier 2 services plus use of devices typically requiring a few hundred watt like rice cookers, fridges	mini-grid	92,600
2	Bright light, radio, telephone plus use of devices typically requiring tens of watts like TV, video, fan	solar home system	687,415
1	Medium bright light (150 lumen-hours) and, if possible, limited radio use and telephone charging	pico PV, battery charging station	131,750
		total:	1,393,075

The corresponding tier system for improved cookstoves is still in process.

When looking at the overall EnDev programme, starting from phase one in 2005 up to June 2013 in phase two, the total number of people, having gained sustainable access to modern energy services on household level amounts to **11 million** (Graph 2). The total number of social institutions and enterprises benefitting from EnDev is more than 8,000 and 20,000, respectively.

Graph 2: Number of household members provided with modern energy services in a sustainable manner (EnDev 1 and EnDev 2)



The absolute (non-corrected) numbers of verified beneficiaries are 9.3 million for EnDev 2 and 18.2 million for EnDev 1+2.

Impact studies

EnDev is continuously analysing the impacts of the different country activities to verify the assumptions regarding the impact of energy development measures, the links between energy for development and the Millennium Development Goals and to check the sustainability of the EnDev results and impacts. Up to now 28 baseline, 54 impact, 16 sustainability and 10 socio-economic studies have already been carried out. Recently impact studies in Ethiopia (PV systems for health centres), Kenya (sustainability of stoves), Benin (impact of grid connection), and Bangladesh (impact of SHS and SSHS) have been completed. Furthermore, multiple studies are on-going and planned. As an example the main findings of the Ethiopian and Kenya studies are summarized in the two text boxes.

Box 1: Sustainability of improved cooking activities in Kenya

A sustainability assessment of activities in the cooking sector was conducted in 2012/ 2013. The outcome monitoring indicated that EnDev-Kenya had reached in total 3.4 million people. To study whether a sustainable stove market had been established, 1193 households and 83 stove dealers were interviewed. In addition, qualitative interviews with political and implementing partners were executed in active and pull-out areas to establish comparability.

The report confirmed that ICS are widely spread and used (measured by the penetration, respectively the usage rate). Furthermore, penetration and usage rates were higher in pull-out areas when compared to active areas (76.3 per cent and 89.3 per cent in pull-out vis-à-vis 67.4 per cent and 88.8 per cent in active areas). This indicates high acceptance of the cooking technologies among the target group of rural households and sustainability of the project interventions. 47.7 per cent of the households in active, respectively 49.2 per cent of the households in pull-out areas maintained their ICS. Concerning the ultimate test to the sustainability of the project, the replacement rate indicates that 34.5 per cent of the households in active, respectively 49.2 per cent of the households in pull-out areas replace their ICS when damaged beyond repairs.

As of the stove dealer interviews, most dealers stated to make a profit out of the stove business, with the majority showing ownership of their enterprise and willingness to expand their market area.

Modern and clean energy services, in combination with high energy efficiency reduce the emission of greenhouse gasses. To calculate EnDev-induced savings, UNFCCC's methodology is being applied.[1] Conservative assumptions based on EnDev's expertise (impact studies etc.) are made whenever default values are not provided within the methodology. The major share of the CO_2 emissions avoided originates from biomass saved in improved cookstoves. As an exception EnDev uses 50% as default value for non-renewable biomass compared to default values of between 82% and 92% (as provided by UNFCCC).[2] EnDev flags any cooking technologies disseminated in projects that are already registered or plan to register in future for carbon funding. Any results achieved in projects related to carbon funding are excluded from the figures presented for emission savings achieved through EnDev.

Box 2: Impact Assessment on the Electrification of Health Centres in Ethiopia

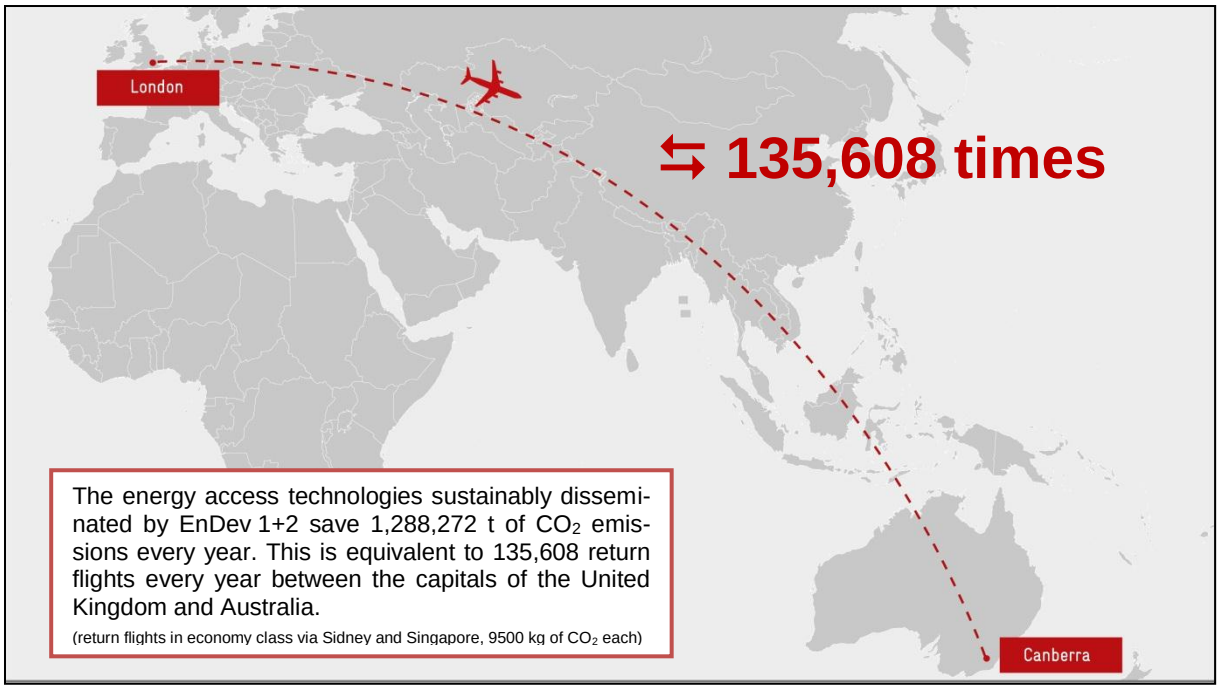
Starting in 2009, EnDev-Ethiopia endowed rural health centres with photovoltaic systems. Doing so, EnDev-Ethiopia envisages improving the living conditions of the people living in proximity to the health centres, the quality and quantity of medical services provided, and the working condition of the health staff. In its investigation of the current situation, the study detects that the number of night deliveries, laboratory tests, and storage possibilities of vaccinations improved.

This is in line with the EnDev philosophy of always being conservative when claiming outcomes and impacts. This conservative approach leads to total calculated savings of 1,288,272 t / CO_2 per year.[3] Applying 82% as default value for non-renewable biomass in the calculation of stove savings, the total would amount to 1.745.784 t / CO_2 per year.

[1] AMS-III.AR; AMS-I.A; AMS-I.F; AMS-II.G; http://cdm.unfccc.int/methodologies/SSCmethodologies/approved
[2] http://cdm.unfccc.int/DNA/fNRB/index.html
[3] For the time being the CO_2 savings per year are only calculated for solar home systems, off grid hydropower, pico pv and improved cookstoves of EnDev 1 and EnDev 2, which were in use in June 2013. The calculation is according to UNFCCC based on default values and were necessary own assumptions.

- a household provided with electricity saves fuel of two kerosene lanterns (0.15 t / CO_2 per year)
- a household with an improved cookstove saves 0.54 t / CO_2 per year

Within EnDev the adjusted outcome figures are used to calculate the CO_2 savings. However, only the Replacement Factor (sustainable used systems) and the Windfall Gain Factor (systems would have been sold even without EnDev) are applied. The Double Energy Factor will not be applied, as both "electrical systems" as well as improved cookstoves contribute to CO_2 reduction.



The energy access technologies sustainably disseminated by EnDev 1+2 save 1,288,272 t of CO_2 emissions every year. This is equivalent to 135,608 return flights every year between the capitals of the United Kingdom and Australia.

(return flights in economy class via Sidney and Singapore, 9500 kg of CO_2 each)

C. Overview about planned country activities in 2014 under EnDev 2

The total budget of the second phase is currently EUR 187.7 million. This budget includes an increase of the German BMZ contribution of EUR 1.8 million in October 2013. Also the Norwegian Ministry of Foreign Affairs already decided to increase funding to EnDev by at least EUR 10 million. A final decision about the additional Norwegian funds is expected by the end of November latest. The present up-scaling proposals are presented with the additional funding of at least EUR 10 million from Norway in mind.

Total budget in EUR		
EnDev 1		
DGIS	60.0 million	
BMZ	unspecified	
EnDev 2		
DGIS	72.0 million	38.3%
BMZ	41.8 million	22.3%
DFID	37.2 million	19.8%
AusAid	15.8 million	8.4%
MFA-NO	8.3 million	4.5%
DEZA/SDC	7.5 million	4.0%
EU-EF	4.4 million	2.3%
Irish Aid	0.7 million	0.4%
Subtotal	**187.7 million**	**100%**
Total:	**247.7 million**	

The governing board of the programme approved up to now 27 projects in 24 countries. Some projects are on-going without any further need for up-scaling and extension of the project period (Tab. 1). Some other country activities are foreseen to be extended without up-scaling (Tab. 2). Some countries are planning to increase their activities within the current project period and apply for additional funding (Tab. 3). In other cases up-scaling is linked to an extension of the project period (Tab. 4).

Tab. 1: On-going country activities under EnDev 2 **without changes**

Country	Activities	Project Duration		Funding	Planned outcomes on household level
		Start	End	in EUR 1,000	In persons
Benin	stoves	10/09	12/14	4,000	800,000
Benin	r.e.	10/09	06/17	7,160	406,415
Burkina Faso	stoves	10/09	12/14	3,500	500,000
Burundi	r.e., stoves	09/10	12/14	1,500	131,000
Honduras	r.e., stoves	10/09	12/14	5,630	174,300
Indonesia	biogas	12/12	12/14	1,150	20,000
Madagascar	stoves	12/12	03/14	300	47,500
Mozambique	r.e., stoves	01/10	12/15	10,800	321,000
Nepal	grid, hydropower	05/09	06/15	4,740	240,637
Nicaragua	r.e., stoves	10/09	12/14	5,640	174,000
Peru	grid, SHS, stoves	07/09	12/15	11,350	485,000
Senegal	r.e., stoves	04/09	12/14	8,500	559,700
Tanzania	stoves	12/12	06/17	2,041	226,970
Vietnam	biogas	07/13	06/17	3,740	275,000

Tab. 2: Country activities intended to **be extended** without up-scaling

Country	Activities	Project Duration			Funding	Planned outcomes on household level
		Start	Old end	New End	In 1,000 EUR	In persons
Cambodia	Biogas	12/12	12/14	03/15	2,000	58,515
Ghana	Grid	01/10	06/14	12/14	1,650	600 MSMEs
Liberia	pico PV, solar dryer, stoves	05/12	06/14	12/14	990	10,500

Tab. 3: Country activities intended to **be up-scaled** within the current project period

Country	Activities	Project Duration		Funding in 1,000 EUR		Planned outcomes on household level (persons)	
		Start	End	Old Funding	New Funding	old	new
Bangladesh	stoves, solar	06/09	6/17	12,064	14,064	2,158,225	2,656,000
Ethiopia	Solar, MHP, stoves	01/10	6/17	12,687	15,467	930,000	1,055,000

Tab. 4: Country activities intended **to be scaled up and extended**

Country	Activities	Project Duration			Funding in 1,000 EUR		Planned outcomes on household level in persons	
		Start	Old End	New End	Old Funding	New Fund-ing	Old target	New tar-get
Bolivia	r.e., stoves	10/09	12/14	06/16	9,400	11,400	512,000	637,000
Indonesia	solar, hy-dropower	05/09	06/14	07/18	9,000	11,960	112,000	172,000
Kenya	pico PV, stoves	07/09	12/14	12/15	6,800	7,800	3,770,000	3,940,000
Malawi	stoves	12/12	03/14	12/14	250	500	62,500	125,000
Mali	BCS, mini-grid	01/13	12/14	12/17	850	3,000	19,800	100,000
Rwanda	hydropower, biogas, solar	10/09	12/14	12/17	12,490	15,490	938,994	1,028,634
Uganda	r.e., stoves	04/09	12/14	12/17	6,000	14,500	612,500	652,500

D. Overview about planned general EnDev activities

Cooperation with other organisations and initiatives

EnDev has been asked to organise and co-chair a session at the next international conference on rural energy access organized by UN-Energy/DESA as part of the **Sustainable Energy for All Initiative (SE4All).** The conference will take place in Addis Ababa on 6-8 December 2013. EnDev will test the SE4All methodology to monitor access to electricity of the tracking framework and participate actively in discussion on a tier system for cooking systems. EnDev will continue to contribute actively to events and campaigns that are linked to the UN initiative and support action plans on country level.

In countries that are part of the **Energy+** initiative, EnDev will coordinate its activities with those planned by Norway and partner countries. EnDev generally follows a bottom-up approach, which is complementary to governmental measures that are part of the Result Based Aid approach of the Energy+ initiative. EnDev will provide the lessons learnt of its programme and contribute to capacity development of partner organisations as part of Energy+ activities.

EnDev is regularly exchanging information with the **EU-Energy Initiative Partnership Dialogue Facility (EUEI-PDF)** and supports the **Africa-EU Renewable Energy Cooperation Program (RECP)** as well as the **EU-Africa Energy Partnership (AEEP)**.

EnDev is cooperating with several **World Bank** Group programmes on national as well as on international level including the **Lighting Africa/Lighting Global** initiative. EnDev is currently coordinating several country projects such as Bangladesh, Ethiopia, Tanzania with Lighting Global and organising a discussion forum on distribution systems for solar systems in rural areas. The approval of an international quality and testing standard for solar lanterns by ISO has been finalised and is now promoted in EnDev programmes.

EnDev is discussing with **ADB** a possible cooperation on the Energy for All agenda. ADB is interested in identifying innovative and successful project concepts that might be scaled up with ADB loan funding. ADB sees EnDev as a possible source for new (but bankable) concepts, as well as a programme providing 'pilots' that can be directly scaled up by ADB loan financing. Scaling up activities and transferring them into a more loan and less grant oriented environment is interesting from EnDev's sustainability perspective, too, although in the first phases of such a loan, additional EnDev support (in terms of TA and grants) might still be required. Currently a future cooperation in Bangladesh is discussed.

EnDev actively contributes to the **Global Alliance for Clean Cook Stoves**. EnDev experts are participating in working groups of the alliance and provide other kind of support. In addition, EnDev will be part of the working group to establish access indicators and to establish standards for cook stoves.

Impact Monitoring and Evaluation

As described in chapter A and B, EnDev continues to invest resources in the monitoring of outcomes and impacts. This includes the general evaluation of the overall programme currently being contracted, but also a number of more specific studies that will directly inform implementation of country measures. In 2014, the tools developed, such as the quality criteria or the market development indicators, shall find wider adoption in the implementation of studies. Additional activities in the field of impact monitoring and evaluation in 2014 will be:

- Implementation of at least one sustainability study for stoves in Ethiopia and a follow-up sustainability study for stoves in Kenya
- Implementation of at least two impact studies related to a specific approach, topic or technology (health, productive use, etc.).
- Implementation of a detailed market development study in Malawi
- Sector development study in Rwanda

- Improved sharing of evaluation experiences by expanding the tool-box (such as result chains, sample questionnaires, other tools) in energypedia and in the EnDev-Wiki

Energypedia

In March 2012, energypedia being founded by EnDev was constituted as an independent non-profit organisation to operate the open and free knowledge platform for sharing information about renewable energies.

The outsourcing of www.energypedia.info to an independent organisation was mainly done to assure the sustainability of energypedia and to avoid that funding for energypedia depends on the project life span of Energising Development

In April 2012, an additional energypedia consultancy was founded offering commercial services like customer-specific wiki solutions, web based monitoring tools and trainings. Profits will be transferred to the existing non-profit organisation, allowing a more independent financing. The overall goal of this organisational structure is the sustainable build-up of stable structures and a smooth long-term operation of www.energypedia.info.

The EnDev-Wiki is one of the restricted workspaces within energypedia and is the common interaction platform for all EnDev stakeholders and aims to improve the workflow efficiency.

In 2014, EnDev will continue to support energypedia with the aim to achieve independent financial viability of energypedia by the end of the year.

Public Relation Activities

By 2013, EnDev had achieved the milestone of 10 million people that got access to modern energy technologies and services. This success was made known to the outside world through major communication activities. EnDev developed an illustrative film clip, describing the approach and impacts of the EnDev programme (http://www.youtube.com/watch?v=TwTaZuHuDNI). In addition, several EnDev donors (like DFID & BMZ) as well as the SE4All initiative announced EnDev's success of reaching 10 million beneficiaries on their Twitter and Facebook pages.

Further the EnDev Report on Impacts "Empowering People" was published, to describe how access to modern energy devices can improve living conditions for people. The basis for this report was provided by the large number of studies, which EnDev carried out during the past years. (http://www.energypedia.info/wiki/EnDev_Report_on_Impacts).

During the Vienna Energy Forum of the SE4All Initiative, EnDev organised a reception to celebrate the 10 millionth beneficiary. Representatives of Germany, the Netherlands, and Norway, including the Norwegian Minister for International Development were present, as well as partner representatives like the Kenyan Energy Ministry. Kandeh K. Yumkella as co-chair of the UN Secretary-General's High-level Group on Sustainable Energy for All acknowledged EnDev's experience and success in his speech. The EnDev film and the Report on Impacts were launched officially during this reception.

In 2014, EnDev will focus its Public Relation activities on publishing articles about results and impacts of the programme, on participating at public events and on up-dating the EnDev website as main source of information for the interested public.

E. Status of country activities

Bangladesh

Promoted technology	Solar Home Systems / Pico PV systems / Stoves			
Project budget	EUR 12,064,000	**Spent until reporting date**	EUR 6,218,293	
Project period	06.2009 – 6.2017	**Reporting period**	06.2013	
Lead political partner	Bangladesh Ministry of Power, Energy and Mineral Resources			
Implementing organisation	GIZ			
Implementing partner	Infrastructure Development Company Limited (IDCOL) and 46 private companies (SHS), around 100 NGOs(Stoves) and 3,900 SMEs in Bangladesh			
Coordination with other programmes	Renewable Energy and Energy Efficiency / Sustainable Energy for Development – SED (BMZ); GEF, KfW, IDA, GPOBA (DFID), GPOBA (SIDA), ADB, WB through IDCOL			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	1,478,225	778,839	901,167	people
Cooking energy for households	680,000	497,892	804,727	people
Electricity and/or cooking energy for social infrastructure				institutions
Energy for productive use/ income generation				SMEs

Project strategy and key components

Since 2003, EnDev-Bangladesh supports the dissemination of solar home systems, initially focussing on bigger systems, since 2011 concentrating on 10-30 Wp systems (small solar home systems, SSHS). Partner organizations sell the system to households which receive a buy down grant of USD 20-25 from EnDev and other donors. The solar activities are coordinated by the Infrastructure Development Company Limited (IDCOL). IDCOL is contracting and monitoring the 29 partner organisations involved in the dissemination of SHS / SSHS.

EnDev is currently preparing the introduction of pico PV systems (1-10 Wp) on a large scale. These systems are already available in the market. However, poor quality products are dominating and spoiling the image and prospects of pico PV systems. EnDev tries to raise awareness for quality through consumer information and systematic introduction of good quality pico PV systems. Pico PV systems that fulfil certain minimum quality and performance requirements will be eligible for a result based subsidy whose amount depends on the system's lighting performance parameters.

In the field of improved cookstoves, EnDev is working with dozens of partner organisations and 3,900 SMEs who produce and sell ICS to households. EnDev supports training for trainers of stove builders and sales/marketing staff, provides support for the marketing of ICS, and introduces quality assurance and monitoring mechanisms. The project has established a partnership with the Ministry of Environments and Forests. The ministry provides a subsidy for the stoves for different target groups (BDT 250 general, BDT 500 for poor households, BDT 700 for poor freedom fighters[4]).

Project progress (overall progress towards outcome target EnDev 2)

Between 2003 and June 2013 more than 1.5 million SHS and 650,000 **SSHS** have been sold through the IDCOL distribution system supported by EnDev. The average sales figures in

[4]EUR 1 = BDT 102 (30 June 2013)

2012 indicate that a sustainable and vital market for solar home systems is almost completely established. Initially, further support for SHS and SSHS was not planned, but in the case of SSHS additional funds for subsidies are provided to fully develop the market for these products which are beneficial especially for poor target groups. Data for the first half of 2013 indicates that over 200,000 SSHS were disseminated. Average sales figures increased to 34,000 SSHS per month, up from 19,000 SSHS during the same period in 2012.

As for bigger solar home systems, EnDev contributed significantly to their market development. Therefore, 10% of IDCOL's SHS sales is counted as EnDev's outcome since funding phased out (December 2010), corresponding to EnDev's donor share at the time

Pico PV activities have been delayed significantly. This was caused by initial delays in the availability of appropriate devices as well as unfortunate taxation regulations. EnDev has in the meantime been successfully working towards the reduction of import taxes on small solar PV products from 150% to only 35%. 3,000 systems were sold during a field trial to test the supply chain, including kerosene vendors, also yielding a better estimate of the pricing structure within the segment.

After phasing out the direct contribution for **ICS,** the project has shifted its activities more towards marketing and awareness building measures, which resulted in an additional 6,500 ICS disseminated through NGO partners during the first half of 2013. Besides NGO partners, the project encourages and supports small, rural sanitary shops to promote and sell stoves. In the past 6 months nearly 100,000 ICS were disseminated through 3,900 entrepreneurs, increasing overall outcome by 60% in just one semester, while also the number of stoves installed monthly increased rapidly, from about 10,000 in December to over 32,000 in June. Additional to the existing 500 stove promoters, 600 women promotional volunteers are now in the field, which are continuously supporting entrepreneurs and approach local government levels, provide trainings to users and stove builders and create awareness amongst the population. As this is the only new factor, the very strong increase in the number of stoves distributed can largely be attributed to these women promotional volunteers.

Due to the rapid growth and as more insights on households cooking behaviour are required for a better estimate of the impact, monitoring practices are currently subject to revision. While lab tests have shown that the promoted stove model can save up to 50%, some studies[5] indicate that ICS often do not realize the promised savings due to several user related factors. Together with the effects of deterioration, these areas will be explored further in order to establish a professional stove sector in Bangladesh.

Sustainability and handover strategy

Demand and sales figures for SHS are expected to remain high. No further support from donors is needed. In the case of SSHS, subsidies will decrease and end over time. Similar to SHS / SSHS, the approach for pico PV is to initially stimulate the market through a subsidy scheme and to reduce subsidies when the market is taking up. IDCOL is committed to continue pico PV activities once the technology is proven, using its extensive countrywide supplier structure. Assuming a high demand for these systems, a sustainable market can be established within a quite short timeframe.

A direct incentive has been introduced by the GoB through the Ministry of Environment and Forests (MoEF), which is envisaging further allocations to support the ICS dissemination process through a buy down grant. The direct involvement and effort of the GoB to provide ICS to poor households in Bangladesh (and their goal to cover 100% of all households by 2021) reflects the importance of this technology in Bangladesh. Further EnDev activities will aim at acquisition of further partners and organisations, training of stove builders, promoters and marketing staff, quality assurance and product development in order to stabilize the market and introduce a wider variety of products.

[5]E.g. "Up in Smoke" Duflo, Hanna, Greenstone2012: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2039004

Benin stoves

Promoted technology	Stoves			
Project budget	EUR 4,000,000	**Spent until reporting date**	EUR 1,616,112	
Project period	10.2009 – 12.2014	**Reporting period**	06.2013	
Lead political partner	Ministry of Agriculture, Breeding and Fishery			
Implementing organisation	GIZ			
Implementing partner	Ministry of Energy, petroleum and Mine Research, Water and Renewable Energy Development			
Coordination with other programmes	Promotion de l'Agriculture (ProAgri / GIZ)			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	0	0	0	people
Cooking/thermal energy for households	800,000	415,013	622,151	people
Electricity and/or cooking/thermal energy for social infrastructure	0	(18)	(18)	institutions
Energy for productive use/ income generation	0	0	0	SMEs

Project strategy and key components

In EnDev2, the Benin stove project called FABEN has three main components: (1) to massively scale-up the promotional activities for improved fuel wood and charcoal stoves (ICS) in new intervention zones in order to push stove sales of the producers trained so far;. (2) to consolidate and extend in a targeted way the production capacities in the new intervention zone to ensure quality stove production and to address additional markets not yet targeted in these areas and (3) to progress in the phasing-out of the EnDev1 intervention zone in order to prepare producers and customers for their long term self-reliance as market actors.

The EnDev stoves programme in Benin is also part of the regional cooking energy programme ProCEAO (12/2011 - 12/2014), which is co-financed by the EU. The outcome target of ProCEAO for Benin is 90,000 people (additionally to the above reported EnDev targets).

Project progress (overall progress towards outcome target EnDev 2)

Overall, FABEN has increased its outcome by 50% as compared to the last reporting period and has actually reached 78% of its new target. The programme is therefore on track. Substantial growth of stoves sales in all three geographical intervention zones contributed to this result.

Component 1: FABEN has continued and scaled up media campaigns and public events to increase the visibility of all EnDev supported ICS producers and retailers. The brand name "Anfani" is used to advertise all EnDev promoted ICS.

Component 2: FABEN has addressed additional markets not yet targeted in Cotonou and Porto-Novo where new producers have been trained in April with respect to the "éclair" charcoal stove.

Component 3: In the old EnDev1 areas, stove sales have increased by 25% compared to the last quarter due to the promotional activities undertaken in component 1. At the same time the phasing-out activities have been progressed. In 2013, the focus of activities has been on supporting associations of producers in terms of organisation, management, marketing and quality control. The associations are now present in each commune and allow stove producers who might have been isolated and working individually to band together, pool marketing, and create economies of scale by aggregating purchases, storage and distribution.

A particular focus of activities has also been promoting the new "éclair" charcoal stove. A total of 9,412 stoves were sold in Benin during this first semester, an increase of 60% compared to the previous semester. Éclair sales accounted for 62% of all metal charcoal stove sales reported this semester by FABEN. The overall market segment of metal charcoal stoves has also increased by 24% from previous semester. Since the first éclair stoves have been sold 12 months ago, a study had been deployed to assess if the stoves retain their "improved performance" over time. Results show that in the first 12 months of use, there is no significant and consistent drop of performance to be observed. Furthermore, it was assessed if there are significant observations on damages which could limit the life span of the stove. Generally the condition of the stoves in use was good. However, some stoves developed damages, particularly on the charcoal holding grill. This type of damage is common even for the baseline stoves and households have practice in dealing with them. However, options for addressing these observations will be developed in future éclair design revisions.

In the ProCEAO intervention zone in Benin, 35,804 people have been reached with ICS since the beginning of the intervention (approximately 40% of the set target).

Sustainability and handover strategy

For EnDev1 villages and producers, please see component 3 in the section above. EnDev2 intervention zones are so far still in the building-up phase where the focus is on the expansion of production capacities and marketing structures.

However, it has been discovered that particularly in the South, there is already an established structure of retailers (particularly women) who buy stoves in bulk and sell them to customers in different areas of Benin. By channelling some of the “anfani stoves” through these structures, the sustainability of supply-demand systems is already improved.

The target of component 1 to “massively scale-up the promotional activities for ICS in the new intervention zones of EnDev2” bears the risk that sales will be pushed to an artificially high level which cannot be sustained after the end of the phase. FABEN is aware of this risk. While it is unlikely that producers will be able to finance TV or theatre campaigns through their own income from stoves in the future, they are already now requested to make their own contribution to the marketing wherever possible. This includes the transportation costs for their ICS to the venue of public sales events on markets and road sides.

Benin electrification

Promoted technology	Grid / Pico PV			
Project budget	EUR 7,160,000	**Spent until reporting date**	EUR 1,604,495	
Project period	01.2009 - 06.2017	**Reporting period**	06.2013	
Lead political partner	Ministry of Energy, Oil and Mining Research, Water and Renewable Energy Development			
Implementing organisation	GIZ			
Implementing partner	Société Beninoise d'Energie Electrique (SBBEE), Agence Béninoise d'Electrification Rurale (ABERME),			
Coordination with other programmes	ACP – EU-Energy Facility, Agence Française de Développement (AFD), BMZ – GIZ Agriculture Programme, BMZ – GIZ Decentralisation Programme and BMZ – GIZ Water Programme			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	406,415	8,519[6]	7,202[7]	people
Cooking energy for households	0	0	0	people
Electricity and/or cooking energy for social infrastructure	100	58	58	institutions
Energy for productive use/ income generation	100	53	53	SMEs

Project strategy and key components

EnDev RE Benin targets grid extension and densification of village grids through a cooperation with the national utility SBEE and within an EU-EF, AFD and BMZ co-financed programme. The project provides technical assistance in all stages of the project (e.g. planning, tendering, acceptance, procurement and intermediate storage of construction materials, supervision of construction work, quality control, communication with and sensitisation/information of target group). EnDev2 Benin aims to electrify 220,000 people (16,800 connections) in 105 villages. A proportional 18.429 people will be accountable to EnDev.

Between 2007 and 2009 (EnDev 1) the grid was extended to twelve villages. In 2010 SBEE connected households to the grid in the villages thus providing access to electricity to 8,519 people. After that, no further connections have been carried out by SBEE but instead the population itself with inadequate material and low technical quality has drawn numerous secondary connections. Those additional secondary connections not created or encouraged by the project – are linked to high-energy losses and considerable risks for the population regarding technical security.

EnDev II Benin was scaled up in May 2013 to transform at least 5,000 secondary connections to approved primary connections or to create new ones with little additional investment, in order to improve their technical security of village grids and in parallel raising awareness for security issues among target group and energy provider, developing training modules for local electricians as well as extending low-voltage grid within some villages if larger groups of the population can be reached with small budget.

[6] These outcomes are a result of infrastructure built under EnDev 1. Household connections and aftercare however took place under EnDev2

[7] Not a reduction in physical connections, but an adjustment due to a more precise calculation of other donors' contribution

Additional to grid extension, a market for PV products is initiated via RBF. At present, only 4.5 % of all rural households are connected to the national grid, and those few who are connected suffer frequent power-cuts. A field study proved that there is an enormous demand for PV technology, being practically unavailable in the Benin market, if only it is offered at a reasonable price and made available in rural areas. A four year RBF project, approved May 2013, aims at developing the PV market by ex-post incentives, paid on verified sales of quality products to the distributing companies and users in the case of solar streetlight and solar pumps. Preparations will start in September.

Project progress (overall progress towards outcome target EnDev 2)

In the grid extension component, no connections have been accomplished under the EnDev 2 / Energy Facility component yet. Main reasons for the delay are difficult and time-/resource-consuming tendering and procurement procedures, highly complicated procedures for tax exemptions of imported material, a seven months delay for confirmation of construction contracts by national authorities, the cease of all activities of an NGO-consortium – contracted by Ministry of Finance – in 07/2012 (due to corruption issues) and the slow progress of selected construction companies. Provision of construction material was largely accomplished by 06/2013 however, with last volumes of material still arriving between August and October 2013.

Faced with problems beyond EnDev's control, but critical for project implementation, EnDev agreed to finance and manage the key-tasks of the intermediation (i.e. increasing mobilisation, measuring GPS-coordinates of clients, safe use of electricity, promoting productive use). A group of nine new animators in only three months of time raised the mobilisation rate from 12,000 to 17,000, took GPS addresses of 10,000 households and considerably improved the reliability of the local cash registers, held for every village.

Sustainability, learning experiences and innovation

A close cooperation between GIZ staff and technical and administrative staff from SBEE and ABERME support sustainability in both planning and implementation. The functioning of the extended grid will be assured by SBEE, however, as experience from the 12 village project (EnDev 1) has shown, SBEE does not densify the grid or increase the connection rate within villages already connected. Additional to previous reports, the following lessons could be drawn:

– The planning stage for a grid layout map is crucial and should be carried out carefully. SBEE has learnt, although continuous support is still necessary, to improve its planning methods by considering apart from technical and financial aspects socio-economic framework conditions and interest of end-consumers. SBEE staff applies relevant elements of these planning methods also in planning and monitoring of other grid-extension projects.

– In April 2010, the Minister of Energy approved new construction standards for power lines (e.g. regarding type of cable, power poles, height etc.), developed by the EnDev 2 / Energy Facility project, allowing a cost reduction of about 25%. Henceforth, these more effective standards will be applied for any future electrification project.

– Convincing the target group to contribute their share to the procurement of electrical meters is confronted by their mentality to wait until the meters are installed.

– Pre-paid meters with STS protocol and charging via SMS, group connections, prove to be adequate structures for tariff collection

– Security of in-house-connections, carried out by local electricians or untrained villagers, is a crucial aspect for sustainability of grid-extension projects and should be addressed by sensitization and training activities, integrated into the social intermediation process.

Bolivia

Promoted technology	Grid / Solar / Stoves / Hydro / Pico PV		
Project budget	EUR 9,400,000	**Spent until reporting date**	EUR 6,635,216
Project period	10.2009 – 12.2014	**Reporting period**	06.2013
Lead political partner	Ministry for Hydrocarbons and Energy (MHE), Vice Ministry for Electricity and Renewable Energy (VMEEA)		
Implementing organisation	GIZ		
Implementing partner	Vice Ministry for Electricity and Renewable Energy (VMEEA), business associations, NGOs, municipalities, communities, cooperatives, electricity utilities		
Coordination with other programmes	PROAGRO (BMZ), IDTR (World Bank), PEVD		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	300,000	153,394	191,297	people
Cooking/thermal energy for households	212,000	209,584	223,103	people
Electricity and/or cooking/thermal energy for social infrastructure	2,700	1,927	1,999	institutions
Energy for productive use/ income generation	11,200	7,091	8,574	SMEs

Project strategy and key components

The strategy is demand-driven and based on the principle of mobilisation of local resources with the direct participation and involvement of beneficiaries and/or implementing partners at different government levels. Advice focuses on planning, implementation and M&E. The project's main activities continue to focus on co-financing energy access, development of local capacities and the creation and promotion of financially sustainable markets with the following key activities:

- Design of policies and co-financing mechanisms for better access to modern energy.
- Support producers / retailers / providers/ installers in the provision of modern energy products and services (training and advising)
- Support awareness and public relations campaigns about indoor air pollution, productive use of energy, proper use of natural gas and safe domestic electrical installations.
- Facilitate and support networking between stakeholders in the energy sector with a multilevel approach.

Project progress (overall progress towards outcome target EnDev 2)

The National Government continues to nationalise the main electricity distribution companies. This process currently limits the ability of these utilities to act. Therefore, some of the grid densification activities have been postponed to next semester. The VMEEA together with EnDev began a pilot distribution of 1,800 pico PV systems for families in the Amazon region (results will be reported in the next semester). The strategy includes trainings for local retailers in order to sustain the approach and develop a market for pico PV.

During this semester, over 8,500 improved firewood cookstoves have been installed country wide, overachieving this phase's target. Installation of the mud/concrete stoves is often sup-

ported by municipalities, which include subsidies in their regular budget to buy the non-local components such as the metallic chimneys and racks and/or contract local installers.

For social infrastructure, EnDev has been working together with the regional governments of Oruro and Potosí to introduce solar energy (PV and/or thermal) in more than 200 newly constructed public buildings. It is expected that at least 30 of these projects will be executed in the near future using local investment. With EnDev's technical support, the regional governments gain technical knowledge in order to integrate solar technologies as part of their public building equipment (lighting and solar water heaters).

The energy for productive use component established new alliances for implementation. This includes the National Fund for Productive Activities (FPS) and two microfinance institutions, which will provide better services and proper dimensioning of productive use technologies by integrating EnDev's technical assistance. Coordination was started with two electricity utilities (in Potosí and Santa Cruz) to encourage them to implement the "electricity access for productive uses" strategy, which aims at grid extension and/or installation of voltage transformers for small and medium enterprises to increase electricity demand and thus improve the economic viability of grid extensions.

Sustainability and handover strategy

EnDev is supporting the VMEEA and the National Electricity Authority with technical assistance to introduce regulations that enforce all future grid extension projects to provide meters as well as other connection components. Additionally, EnDev and the VMEEA have analysed suitable off-grid technologies to provide electricity access in remote and isolated areas (minigrids, pico PV).

For stoves, direct implementation with local NGO and/or enterprises is on-going with the goal of handing over the strategy to the PEVD programme within the World Bank loan. The financial contribution in the implementation together with municipalities is successively taken over by the municipalities, thus enhancing financial sustainability.

A study is planned for the coming months to evaluate the use, maintenance and replacement of improved cook stoves. The results will be used to adjust the current dissemination strategies. In order to improve the stove itself and the availability of parts, EnDev continues its efforts to identify local providers of chimneys in rural areas. Furthermore the national Stove Testing Center is studying alternatives to substitute the metallic rack with the objective to have a locally available option.

Finally, EnDev encouraged and provided technical assistance at a multi-ministerial level (Housing, Health, Energy, others) for the elaboration of a National Decree regarding the standards for improved stoves in all related programmes (Norm 83001:2012). It is expected that the Decree will be enacted by the end of 2013.

Regarding social infrastructure, a strong capacity building inside the counterpart organisation is still needed. As a first measure EnDev launched the "Olimpiadas del Saber" (Knowlege Olympic Games) which reinforced the knowledge of teachers and health staff in maintenance of the solar systems while at the same time they receive a special training on renewable energy that they can pass on to their students and patients.

It has been agreed with the Universidad Católica Boliviana to work on the inclusion of energy access and productive activities into the regular curricula of the undergraduate programmes held in rural faculties, as well as into courses for municipalities and project developers, with the objective to incorporate energy access in future agriculture and production projects.

Further information

www.endev-bolivia.org

Burkina Faso

Promoted technology	Stoves			
Project budget	EUR 3,500,000	**Spent until reporting date**	EUR 1,828,094	
Project period	05.2009 – 12.2014	**Reporting period**	06.2013	
Lead political partner	Ministry of Environment			
Implementing organisation	GIZ			
Implementing partner	Government institutions, business associations, NGOs, IRSAT			
Coordination with other programmes	PASE-WB; CILLS, SNV (NL)			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	0	0	0	people
Cooking/thermal energy for households	500,000	379,706	362,915	people
Electricity and/or cooking/thermalenergy for social infrastructure	1,000	1,149	1,604	institutions
Energy for productive use/ income generation	6,000	2,484	1,630	SMEs

Project strategy and key components

The EnDev Burkina Faso stove project called FAFASO has 7 components: (1) the further expansion of stove production and promotion in new villages and towns, (2) the consolidation of already existing supply-demand systems in the rural areas, (3) networking with producers in Ouaga and Bobo to ensure high performance after the phasing-out of project support, (4) piloting the "éclair" charcoal stove technology if found appropriate.

A particular focus is the promotion of large scale cooking devices for (5) social institutions and (6) commercial applications such as restaurants, beer brewing and shea butter processing. The named commercial activities are large consumers of firewood with a high potential of wood savings.

In addition to the promotion of efficient demand side devices, (7) the piloting of fuelwood tree plantation and (8) the introduction of agro-waste based fuels are key interventions on the fuel supply side.

Project progress (overall progress towards outcome target EnDev 2)

In the last progress report for Burkina Faso it was already observed that after many years of constant and fast growth the stove sales in Burkina Faso are somehow stagnating in the urban areas and decreasing in the rural areas (due to poor harvest). It was anticipated that – if no sharp increase will be achieved until mid-2013 – the overall result may drop due to the fact that large sales from the first semester of 2011 will exceed their average life span and will be no longer considered in the outcome calculation.

6 month later these predictions have come true. Despite the fact that sales in the old intervention areas of Ouaga and Bobo have reached a new peak, the results in the new rural areas did not recover yet fully from the effect of the poor harvest reported for December 2012 which reduced the available income of rural households. It is anticipated that once the new harvest is back to normal levels, the demand for the stoves will also rise again. FAFASO

prepared for the re-boosting of the rural ICS promotion by increasing the capacity of field supervision which will show its effect in the next reporting period. For the production of clay stoves, the investment into the new kiln technology is already paying off.

Urban metal stove producers in Ouagadougou and Bobo Dioulasso decided to change from individual small scale production to larger working units with division of labour along a production chain. EnDev is supporting this reorganisation by providing advice and some financial support for the purchase of tools and machines. It is anticipated that this change will improve both the efficiency as well as the overall production of stoves.

Some charcoal stove users in Ouaga tested the "éclair" charcoal stove from Benin. Their feedback, alongside with lab test results, has been encouraging. After some adjustments to the design for the market in Burkina Faso, some producers have been trained in producing the "éclair" and a marketing strategy has been developed within the first semester of 2013. First sales will be reported at the end of 2013.

The number of large scale cookstoves sold to social institution is consolidating on a level of app. 800 stoves per semester. The planned target is achieved. This does not apply for the sales-target of beer brewing stoves. It seems that EnDev has overestimated the market potential in the planning of the scaling-up proposal. In the current intervention zone for this product, the majority of beer-brewing centres are already equipped with the new stove and the life span of the product seems to be longer than anticipated. Hence there is little growth potential in these areas. The expansions into new markets for this product yielded first results. Alternative devices for the productive use of thermal biomass energy have been developed, tested and producers have been trained. However, it remains to be seen if the ambitious target of 6,000 SMEs can be achieved until the end of this phase.

Since the granting of the up-scaling proposal end of 2012, the new key interventions on the fuel supply side have been addressed by preparatory works (identification of partners and approaches etc.). No results are yet to be reported.

Sustainability and handover strategy

The producers associations in Ouagadougou and Bobo Dioulasso are now used to autonomously handle large orders. One remaining concern is the quality control: the customer has to control the quality of the stoves, as otherwise the producers tend to look for "shortcuts" in the production. In rural areas, combined associations for the different crafts involved in the production of stoves have been established. The members of these associations plan their work jointly and work accordingly. However, this process is still in the beginning in many of the rural areas.

A study has been implemented to assess the durability and replacement of improved household cookstoves in selected areas. The result was inconclusive, mainly due to the fact that stoves were much longer used than estimated (average life span). Hence very little replacement took place as households continued using the first ICS they bought. It seems that the stove is slowly degrading in a way that households do not perceive that their stove has a reduced efficiency.

Further information

FAFASO is part of the regional programme ProCEAO which is co-financed by EnDev and EU’s 2nd Energy Facility. The intervention zone is located in the northern part of the country. Results of this programme are counted separately from this report. In sum, in the three regions concerned 10,985 stoves have been disseminated since the beginning of activities (02/12), which equals 86,867 people reached.

Burundi

Promoted technology	Solar / Stoves			
Project budget	EUR 1,500,000	**Spent until reporting date**	EUR 651,609	
Project period	09.2010 – 12.2014	**Reporting period**	06.2013	
Lead political partner	Ministry of Energy and Mines (MEM)			
Implementing organisation	GIZ			
Implementing partner	DGHER **–** General Directorate of Water and Rural Energies IFDC – International Fertilization and Development Committee via Catalyst SEW Project			
Coordination with other programmes	ABER – Agence Burundaise d'Energie Rurale, APES – Association pour la Promotion de l'Energie Solaire, GIZ Decentralisation and Poverty Alleviation project (Appui à la Décentralisation et à la Lutte contre la Pauvreté, ADLP)			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	11,000	176	3,553	people
Cooking/thermal energy for households	120,000	10,260	10,260	people
Electricity and/or cooking/thermal energy for social infrastructure	12	3	3	institutions
Energy for productive use/ income generation	150	10	27	SMEs

Project strategy and key components

EnDev Burundi facilitates access to modern energy services for households, SMEs and social institutions in Gitega and Mwaro provinces. The focus is on promotion of PV systems, ranging from Pico PV lanterns up to systems for communal infrastructure. In addition EnDev Burundi supports capacity development in the private sector and on communal basis. The project cooperates with the GIZ Decentralisation and Poverty Reduction Program (ADLP).

The project strategy aims at the creation of 120 Solar Multi Service Stations (SMSS) in which at least three services are offered: phone and battery charging, hair cutting and illumination for neighbouring SME. The SMSSs will also work as "selling points" for pico PV systems.

EnDev established the link between the importers and these SMSSs and organises technical and management training for the operators. As there is limited capacity to install solar systems in Burundi (few qualified technicians), this will be the major constraint. EnDev trains local technicians who will make installations for private households and repair failures. They will be members of the local network of maintenance for solar systems.

EnDev is handled as a mainstreaming topic within ADLP since 2012, which increases the outreach of the promotion activities.

The cooperation through knowledge exchange and joint activities with organisations working on biomass stoves, especially with IFDC are in preparation to be extended.

Project progress (overall progress towards outcome target EnDev 2)

During the reporting period, EnDev activities focused on the installation of the SMSSs. The project did not meet the set target for this period; only 17 additional SMSS were installed, resulting in 27 SMSS since the start of the project. This slow speed was caused by delays in

the procurement process and quality issues when delivering the materials. Additional the small project team suffered again from unforeseen health related absence of key staff. (NB: After the reporting period the installation speed picked up. By the end of August additional 47 SMSS have been installed. If this speed can be kept, all SMSS will be installed in 2013.)

The demand for additional SMSS is continuously voiced to the project by new SME owners thereby showing their readiness to invest in advance. “Seeing in believing” seems to play a major role for increasing the demand. The project will analyse the learnings of this first phase and develop a proposal for upscaling once most stations are operational. Within the new strategy, the subsidy scheme will be revised, resulting in subsidies slowly phasing out.

The observed impact of the SMSS includes access to improved energy services as mobile phone charging, electric light for up to three SMEs close to the SMSS. Amongst these SMEs is normally one hair dresser, which generates additional income for the SMSS owners. EnDev is in the process of establishing links between pico PV distributors and the SMSSs, with the SMSSs serving as local selling points. Three of the pico PV distributors are cooperating with the SMSS, which includes training and technical advice.

The sales of pico PV systems by EnDev supported distributors are increasing. During the last semester more than 3,500 systems have been sold, out of which many however do not meet the EnDev performance criteria. EnDev will continue to promote good quality and well performing products to and through the distributors. But it has to acknowledge that there is also a demand for very low cost solutions that do not reach the EnDev standard.

EnDev Burundi prepares a partnership with FSTE (Fond de Solidarité des Travailleurs de l’Enseignement), a micro-finance organisation for teachers to provide financing services for solar systems. If this collaboration turns out to be successful, this partnership could serve as a best practice and be extended to other financial organizations

The cooperation with IFDC on improved cooking stoves has not been restarted yet. This was mainly caused by unforeseen and long absence of the relevant managers (EnDev as well as IFDC). In the 2nd half of 2013, new staff will be recruited on both sides. EnDev plans to start the cooperation as soon as possible with a smaller budget and target than initially planned. The stove targets will be revised once there is clarity about IFDCs new implementation capacity. The remaining budget will be reallocated towards additional rural electrification activities. Consequently also the electrification target will be revised. The new targets will be presented in the next progress report.

Sustainability and handover strategy

EnDev Burundi strives for sustainability through capacity development, awareness raising and provision of high quality services and products in the market. The project conducts training of technicians and organisations in maintenance systems.

Network building is done between actors such as solar companies in Burundi, SMSS and a pool of technicians, suppliers of quality solar products, micro finance institutions, municipalities, provincial health facilities and education departments.

Pico PV is not subsidized to prevent market distortion. However EnDev Burundi is discussing with private companies on how to support them in promotion activities like advertising, training, forums etc. for pico PVs.

Cambodia

Promoted technology	Biogas		
Project budget	EUR 2,000,000	**Spent until reporting date**	EUR 533,501
Project period	12.2012 – 12.2014	**Reporting period**	06.2013

Lead political partner	Ministry of Agriculture, Forestry and Fisheries
Implementing organisation	SNV in cooperation with GIZ
Implementing partner	National Biodigester Programme (NBP)
Coordination with other programmes	IFAD PADEE

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	13,200	0	307	people
Cooking/thermal energy for households	45,315	0	1,055	people
Electricity and/or cooking/thermal energy for social infrastructure	0	0	0	institutions
Energy for productive use/ income generation	0	0	0	SMEs

Project strategy and key components

EnDev is supporting the National Biogas Programme (NBP) in a first phase of the transition of a grant driven biogas plant market into a commercially viable market supported by carbon funding, by (1) strengthening the private sector supply side actors; (2) support demand side market development by awareness raising and general promotion on provincial level; (3) create a permanent credit scheme for biogas plant construction investment (4) support client empowerment by roll-out of Biogas User Networks (BUN) in all villages of the NBP (5) provide technical assistance alongside the biogas plant value chain and (6) construction of 9,500 biogas installations.

Project progress (overall progress towards outcome target EnDev 2)

In the first three month of the EnDev financed transition phase of the NBP of Cambodia, 223 digesters have been built. Combined with the 286 digesters sold in the first 3 month of the year, the total production per semester was only approximately 25% of the semi-annual production in 2012. Much of the sector infrastructure built over the previous years was crumbling away, as masons/biogas companies (BCCs) left the programme structure and provincial staff became demotivated as their work efforts did not lead to a stabilisation of sales.

The reason for this development was the shortage of funds before the actual start of the EnDev funding, which resulted in a shortage for the provision of subsidy funds. This is a clear demonstration that the current set-up of the biogas sector is not yet sustainable.

In line with the defined key interventions, activities were carried out to strengthen the commercial actors in the biogas value chain and guide them to play a stronger role in the marketing of the biogas digesters. 49 private biogas companies (BCCs) received training and follow-up coaching in sales skills. They facilitate by themselves promotion events with potential biogas clients (now for the first time, before this was done by provincial government staff). A new Sales Manual guides them through the steps of selling. Fifty provincial programme staff members (acting as technical supervisors to the private biogas companies) were trained to assume a role as sales coaches. BCCs have been supported in scheduling more than 900

sales events until the end of the year, reaching out to approximately 14,000 potential biogas digester customers.

Moreover, the programme has begun to involve private biogas companies in the creation of new promotion tools (leaflets, posters, interpersonal sales tools, banners, billboards). For the time being, this primarily serves to sensitise BCCs to the fact that it is also the role of an entrepreneur to actively conduct marketing and present their offerings in an attractive way. However, on the long run they shall also contribute to the costs of the promotional materials through the BCC association.

More confident in sales, BCCs now in turn train their own networks of promoters (e.g. existing biodigester owners, rural veterinarians, etc.) and existing commercial sales networks (e.g. sales agents for water filters, latrines, micro-insurance, etc.) and offer incentives/"finder's fee" for each new client that promoters identify for the BCCs. Approximately 500 promoters will be trained. Collaborations with partner NGOs (e.g. agricultural extension workers of Veterinarians without Borders, etc.) are being actively pursued.

BCCs are also supported in hosting commune workshops to get buy-in/support from local authorities, village and commune chiefs. More than 400 commune workshops with approx. 6,000 local authorities are planned.

A MoU with a third MFI was signed in June, offering affordable biodigester loans to farmer households. Credit workshops for MFI Credit Officers and BCCs and provincial programme staff are currently being planned – to actively engage MFI in the BCCs' sales activities (joint presentations to potential customers). New MFI-branded promotion materials (standing banners and leaflets) have been designed in collaboration with PRASAC MFI and will shortly be printed.

Sustainability and handover strategy

The development at the beginning of this phase clearly indicates that a lot of work still has to be done to develop a sustainable market for biogas digesters. In order to avoid a total collapse of the sector, the subsidy will initially be restored at the previous level of USD150 per plant. However, most of the work reported under project progress is geared to advance in the sustainability of the sector.

As the market actors develop and become more independent, the NBP itself gradually transforms/adjusts its institutional set-up to match its role. The NBP will be supported in working towards an independently operating entity that is financially self-sustaining. In the following months, potential business/institutional models for the NBP will be developed (also building on the learning from other countries), analysed, and consulted with NBP's stakeholders.

NBP's 3rd issuance of carbon funding (for 2012) has been approved – the quickest ever monitoring process. This income paves the way towards financial self-sustainability of the programme.

Further information

For more information on the National Biodigester Programme of Cambodia, please visit http://www.nbp.org.kh/

Ethiopia

Promoted technology	Solar / Stoves / Hydro		
Project budget	EUR 12,687,000[8]	**Spent until reporting date**	EUR 9,473,530
Project period	01.2010 – 06.2017	**Reporting period**	06.2013
Lead political partner	Ministry of Water and Energy (MoWE)		
Implementing organisation	GIZ		
Implementing partner	Ministry of Water and Energy (MoWE) incl. Rural Electrification Fund (REF); Ministries of Agriculture, Health, Education and Trade; Environmental Protection Authority (EPA); Regional Governments / Bureaus of Energy, Education, Health and Agriculture; Universities / Institutes of Technology (IoTs) / Technical Vocational Educational and Training Units (TVETs); Chamber of Commerce & Sectoral Associations; Solar Energy Development Association of Ethiopia (SEDA-E); Ethiopian Hydro Power Society (EHPS); Regional (Development) Associations; private solar energy installation & maintenance companies; other private companies in the energy sector value chain (from input supply to end use); NGOs; Women's Associations; Assistance to Health System Expansion; Community Development Service Association (CDSA)		
Coordination with other programmes	Germany: Sustainable Land Management (SLM) Programme; Urban Governance & Decentralisation Programme (UGDP); Netherlands: SNV Biogas Programme; Horn of Africa Regional Environmental Centre (HoA-REC); Norway: Energy+; Irish Aid: Health Care Programme; World Bank: Energy Access and Electricity Access (Rural) Expansion; Lighting Africa; Global Partnership on Output Based Aid (GPOA); Climate Investment Fund (CIF): Scaling Up Renewable Energy Programme (SREP) - Ethiopia Investment Plan		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	35,000	13,145	86,948	people
Cooking/thermal energy for households	725,000[9]	487,840	495,863	people
Electricity and/or cooking/thermal energy for social infrastructure	450	542	508[10]	institutions
Energy for productive use/ income generation	1,000	1,883	2,269	SMEs

Project strategy and key components

EnDev Ethiopia improves access to energy of poor households based on three types of modern energy services: a) electricity for households based on photovoltaic devices / systems; b) mini-grids based on micro hydropower; and c) energy-efficient improved cook stoves

[8] Including an additional variable up-scaling of up to € 1,020,000 depending on achievements of milestones

[9] In the updated annual planning 2012 originally 620,000 stoves were anticipated as net figure for end of 2013. Adding the RBF target of 275,000 stoves approved with the updated annual planning 2013, the total target till project end arrives at 895,000 stoves. Meanwhile it became obvious that large numbers of stoves sold in 2013 will be needed to replace the high number of stoves sold in 2008. The figures for the "old" stove outcomes before RBF (620,000 stoves) are thus not realistic and were adjusted to a realistic expectation of 450,000 stoves. The total number of household stoves as target till project is thus 725,000 [450,000 (corrected original EnDev net figure) + 275,000 (stoves under RBF)]

[10] The figure decreased considerably due to a necessary correction of the last monitoring data. The figure for ICS for SI which was reported earlier was too high, since 114 stoves older than the lifespan had not been deducted

(ICS). In this context, EnDev is facilitating access to electricity generated by mini hydropower or photovoltaic systems to social institutions and small enterprises as well as ICS to social institutions and small enterprises. This approach aims at establishing a market for rural energy products through creation of demand for new products and at the same time supporting SMEs and setting quality standards for applications such as improved cookstoves and solar lanterns. EnDev Ethiopia also hosts an ICS RBF facility, aimed to start Jan/Feb 2014.

Project progress (overall progress towards outcome target EnDev 2)

From January until June 2013, a total of 67,825 stoves (49,151 Mirt and 18,674 Tikikil) were sold to households. Out of 18,674 Tikikil sales, 16,381 Tikikil stoves were bought by World Vision for its Clean Development Mechanism (CDM) intervention. Furthermore, 137 stoves were sold to 9 social infrastructure institutions as well as 872 stoves to 708 SMEs for productive use purposes. During the reporting period, energy access has been created for 84,948 people through sales of solar home systems, solar lanterns and from electricity generation through micro hydro power plants. A total of 8,285 solar lanterns were sold through private retailers. Due to the adaptation of the EnDev pico PV counting methodology to the one used by SE4All, the calculated number of persons provided with lanterns increased by 41,280 to 69,493 persons. The rate of newly connected households to the minigrids of the hydropower sites is low. Only 73 households were added in this year, because households have to pay for their own connection costs. For households located in longer distance (nearby households have already been connected initially), cost for wiring is higher, while facing difficult economic conditions. By end of 2013 all four plants shall be handed over to the communities as future owners.

The equipment of health centres with solar energy within the cofinancing arrangement with Irish Aid continues. Up to now 20 out of 25 installations have been completed. Due to complications with regard to water drilling procedures, the installation of solar water pumps and water heaters is delayed. Irish Aid is interested to extend the cooperation with EnDev for another year and considers also including the ICS sector, as a new technology for IA's engagement in Ethiopia.

Preparations for the new RBF component have started, and a baseline study is under preparation.

Three of the predefined milestones on project progress have been achieved. The milestone for ICS for households could not be achieved, due to a high deduction rate because many of the stoves provided earlier, exceeded their estimated lifespan (less replacement). The underachievement of this milestone could however be compensated by overachievement of other milestones, and the third part of the variable budget can thus be disbursed. It will be challenging to achieve the next milestone, since the stove replacement rate effect continues.

Sustainability and handover strategy

A stove sustainability study will be conducted at the end of this year. A special focus will be to research on the realistic lifespan of the stoves. Depending on the results, the reduction factor might in future be adjusted.

In order to safeguard the sustainability of the activities, the project exchanges intensely with Ethiopian government institutions. EnDev is regarded by the GoE as pioneer in the ICS sector, and experiences gained in EnDev are taken over for the planning of a large National Cookstove Programme. Both EnDev and GoE ensure the alignment of both interventions.

Sustainability of the hydropower plants seems promising, since the regional government intends to take over the long term responsibility for maintenance and repair. Sustainability for the solar installations for Health Centres shall be ensured through a MoU with the regional health bureaus, who commit themselves to be responsible for maintenance and repair.

Further information

http://endev.energypedia.info/wiki/EnDev-Ethiopia

Ghana

Promoted technology	Grid			
Project budget	EUR 1,650,000	**Spent until reporting date**	EUR 1,003,731	
Project period	01.2010 – 06.2014	**Reporting period**	06.2013	
Lead political partner	Ministry of Trade and Industry			
Implementing organisation	GIZ			
Implementing partner	Ministry of Energy, District, Municipal and Metropolitan Assembies, Local Business Associations, Regional Coordinating Councils, Environmental Protection Agency			
Coordination with other programmes	BMZ: Programme for Sustainable Economic Development (PSED)			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	300	668	975	people
Cooking energy for households				people
Electricity and/or cooking energy for social infrastructure	6 electricity connections of SI or street lighting	3 zones using street lighting	3 zones using street lighting	institutions
Energy for productive use/ income generation	600	203	191	SMEs

Project strategy and key components

In Ghana EnDev continues to focus on the extension of electricity from the national grid to newly established industrial zones. EnDev facilitates a participatory planning process and contributes to the cost of electricity hardware. Local governments contribute by paying for the costs of labour for the installation of the electrical hardware, as well as acquiring and developing suitable land. The local governments also provide additional infrastructure like roads, clean drinking water and toilet facilities. The business associations contribute labour and individual enterprises pay their electricity connection fee. It is also expected that local governments and local business associations will provide street lights at their own cost to improve security. Under EnDev 2, ownership of the local governments is increasingly emphasized for sustainability. The BMZ-financed PSED is supporting the interventions by promoting local economic development activities around the supported zones.

Project progress (overall progress towards outcome target EnDev 2)

Until June 2013, a total of 190 SMEs and 965 persons gained access to electricity through EnDev 2 in ten industrial zones. Unfortunately some enterprises, mainly start-ups, closed their shops and travelled abroad or started other ventures outside the zone. This is due to the general economic down turn before and after the 2012 general elections in Ghana.

The zones are at different stages of development. **Goaso** recorded a small increase in employment in SMEs with electricity. In **Kenyase**, a reduction in companies at the site was recorded. Decreased customer patronage due to poor road conditions is seen as a main cause. The light industrial area at **Bechem** did not record any increase in companies. The zone suffered a major setback when a heavy rainstorm destroyed a number of workshops. **Berekum** light industrial area experienced a net decrease in companies and employees during the reporting period. Some of the artisans had stopped working temporarily to travel abroad or are

engaged in other activities due to the economic down turn in Ghana. **Techiman** light industrial area recorded an increase in the number of companies but some other enterprises closed temporarily. In **Agona Nkwanta**, three additional companies have relocated to the site. **Bekwai** recorded six additional companies, out of which four4 were start-ups. The ECG Head Office has just given approval for the connection of the transformer in Bekwai. However, the connection is slowed down by post-election changes in the local government. In **Agona Swedru**, plot allocations have been done and companies are constructing their structures. In **Sefwi Wiawso**, the site has been connected to the grid. Companies are expected to relocate en mass during the next reporting period.

The remaining EnDev 2 zones are developing at a good pace. In 2013/14, three additional industrial zones are being established in three towns – **Asankragwa**, **Obuasi** and **Asamankese**. The initial planning workshops have taken place within the frame of local economic development actions. Tenders have been issued for the procurement of the electrical hardware. The electricity network at the industrial site at **Dormaa Ahenkro** is completed and connected. The garages association and the municipal assembly are collaborating to complete construction of a borehole and toilet facilities at the site. Five companies had started working at the site, others will soon relocate. **Enchi** industrial site has been completed and connected. 67 companies were recorded. Electrical installations have been completed at **Axim**. Plots have been demarcated and allocations to enterprises are underway. A toilet facility is under construction at the site. Installations in Sokoban, **Kumasi** are completed. The Kumasi Municipal Assembly has constructed the access roads and drainage as well as a toilet. Installations have started in **Suhum** and they are expected to be completed by the next reporting period. A vocational training facility is under construction with funds from a USA based NGO. Installations are yet to start in **Nsuaem**. This is because a private person has claimed ownership of the parcel of land that was allocated by the Traditional Authority. The Local Government has initiated a process to resolve the issue.

As of June 2013, 818 companies were established in the light industrial zones. 282 of the 818 (34%) companies at the light industrial zones can be said to have “new” electricity access for their companies, either because they are a start-up, or they did not have an electricity connection at their old location.

Sustainability, learning experiences and innovation

In the reporting period, the project will step up follow ups and also train focal persons in business trainings and monitoring of outcomes as part of the exit strategy. We continue to use the local economic development forums as strategy to involve local stakeholders in planning and monitoring. We are also pursuing an institutional partnership with the Ghana Skills Development Initiative (GSDI) and the National Board for Small Scale Industries (NBSSI) to establish a home for environmental and business trainings.

Local governments face financial constraints in achieving their goals in the establishment of industrial areas. Beyond the policies, manuals etc., resources need to be mobilised. In the next period, we will be holding discussions with the Ministry of Trade and Industry and the Rural Enterprise Project III (co-financed by IFAD and AfDB) on how they would operationalise broader concept of Light Industrial Area Development as key requirement for the provision of Rural Technology Facilities (RTF).

Further information

In this Annual Planning, the project is proposed to be extended cost neutrally in order to finalise the remaining industrial areas. In the Annual Planning Update 2014 an up scaling proposal with a new and broader approach will be presented.

Extended version of the country sheet is available on the EnDev-Wiki.

Honduras

Promoted technology	PV Systems / Stoves / Micro Hydro Power / Grid		
Project budget	EUR 5,630,000	**Spent until reporting date**	EUR 2,808,136
Project period	10.2009 – 12.2014	**Reporting period**	06.2013
Lead political partner	Instituto de Conservación y Desarrollo Forestal (ICF)		
Implementing organisation	GIZ		
Implementing partner	Communities, NGOs		
Coordination with other programmes	Natural Resources and Economic Development Programme (BMZ)		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	26,000	19,967	19,982	people
Cooking/thermal energy for households	148,300	24,135	27,843	people
Electricity and/or cooking/thermal energy for social infrastructure	475	124	127	institutions
Energy for productive use/ income generation	500	162	163	SMEs

Project strategy and key components

EnDev Honduras is working with local NGOs, local governments and community development programmes under co-financing arrangements between EnDev, partner organisations and beneficiaries. Partners have to be present in the communities. The energy issue is integrated into rural development processes and agricultural and forestry production. A network of partner organisations is created that allows successful implementation of the EnDev activities. Partners are encouraging the formation of local management entities which are trained in technologies, organisation and management to support the beneficiaries in maintenance and repair of the energy systems.

The key components of EnDev Honduras are: a) household lighting by grid, micro hydro power and solar home systems; b) energy for social infrastructure and c) energy for productive use such as: solar coffee and cocoa dryers, stoves for indigenous pottery, bread baking and sugar cane processing.

Project progress (overall progress towards outcome target EnDev 2)

A total of 47,825 persons, 127 social institutions and 163 small and medium enterprises have benefitted during EnDev 2 until June 2013:

- Nine grid extension projects with local governments, community organisations and beneficiaries connected 1,209 households (6,540 persons).
- Solar home systems were installed in 2,140 households, benefiting 12,315 persons.
- 58 schools, 8 health centres and 48 communal centres have gained access to electricity with photovoltaic systems.
- The installation of a micro hydro power plant was co-financed, benefitting 246 households (1,095 persons).
- Three pico hydro projects have provided 6 households with electricity, benefiting 32 persons. One communal centre also gained access to electricity.

- In 5,326 households, improved stoves were installed, providing 27,843 persons access to healthier cooking facilities.
- Improved stoves were also been built in 10 schools, 2 communal centres and one small enterprise.
- Seven organizations of coffee producers gained access through PV systems.
- Solar coffee dryers were installed for 154 cooperatives with a total of 1,292 organised producers.
- A pottery was installed for 1 indigenous cooperative.

Grid extension

A bidding process for the purchase of materials for grid extensions in fifteen communities, in cooperation with the Social Electrification Office (OES) of the National Electric Energy Company (ENEE), will begin in the second semester of 2013, with results in the first quarter of 2014. Around 4,000 households will be connected.

PV for households

Under a contract with partner organisation “Hermandad de Honduras”, the installation of 1,100 SHS nationwide is currently underway. The first reports will be available in the next reporting period.

Pico and Micro hydro power

In a continued relation with the Honduran Association of Coffee Producers (AHPROCAFÉ), one new pico hydro project, utilizing a pump as a turbine and a motor as a generator, was completed. Three households benefitted.

Improved cookstoves

Justa stoves (16” × 24”) were constructed with partner organization AHDESA, benefitting 726 households, 1 school, 2 communal centres and 1 small and medium enterprise. The construction of 1,800 new Justa stoves with 5 different partner organizations is on-going; results will be available in the next reporting period.

Productive use

A contract with AHPROCAFÉ for the construction of 110 solar dryers for small and medium enterprises is underway, with reports available by the end of 2013.

Sustainability and handover strategy

The sustainability strategy of EnDev-Honduras is based on the following pillars:

- Active participation of community organizations in the development of the activities.
- Co-financing mechanisms, involving beneficiaries own contributions of up to 50% of total costs, participatory promotion by local NGOs, and local implementation alliances linking the key public and private actors.
- Capacity development of the partners for the management of technologies, administrative controlling and technical project backstopping and supervision based on an assessment of local needs and dynamics for human development.

Further information

The Central American Fund for Access to Sustainable Energy and Poverty Reduction (FOCAEP) has been created. It will be implemented by HIVOS as Administrative Organisation and BUN-CA as the Technical Secretariat. It will upscale the stove activities of EnDev-Honduras and EnDev-Nicaragua. Its main objective is the market development of improved stoves by strengthening the value chain.

Indonesia electrification

Promoted technology	Solar / Hydro			
Project budget	EUR 9,000,000	**Spent until reporting date**	EUR 7,751,520	
Project period	05.2009 – 06.2014	**Reporting period**	06.2013	
Lead political partner	Ministry of Energy and Mineral Resources (MoEMR)			
Implementing organisation	GIZ			
Implementing partner	MoEMR; Ministry of Home Affairs (MoHA)			
Coordination with other programmes	World Bank Multi-Donor Trust Fund, Indonesian-Dutch Energy Working Group/RE Programme			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	112,000	28,473	69,544[11]	people
Cooking/thermal energy for households				people
Electricity and/or cooking/thermal energy for social infrastructure	200	251	695[12]	institutions
Energy for productive use/ income generation	340	253	869[13]	SMEs

Project strategy and key components

EnDev Indonesia focuses on mini-grid installations based on micro-hydro power and solar photovoltaic technologies. Installations are community operated and administered. Project activities are clustered into a) MHP support, b) solar PV support, c) PUE support, d) capacity development, e) sustainability monitoring and f) knowledge management.

Until mid-2012, EnDev supported MHPs under the Green PNPM programme (pilot programme under Ministry of Home Affairs), which limited its achievement of indicators (particularly when surveys indicated significant discrepancies between planned and actually connected households). Since then, the project adapted its strategy towards more inclusive support of rural electrification programmes initiated by its principal counterpart (DGNREEC) and other third parties, as well as expanding its technology focus. EnDev Indonesia however still limits infrastructure investments and dedicates most resources towards technical support services (design, supervision, commissioning, and quality assurance) and sustainability measures (community preparation, rural electrification programmatic and policy support, monitoring and evaluation, sector development, and productive-use-of-energy initiatives).

Through this strategy EnDev Indonesia supported 136 MHPs under the Green PNPM programme and a further 65 MHPs under DGNREEC, Rural PNPM, local governments and community-based MHPs; and 106 solar PV mini-grids (PV-VP: photovoltaic village power) under DGNREEC (i.e. total 307 rural mini-grids supported, not all sites finalised in June).

EnDev Indonesia's project strategy dedicates a higher degree of resources and attention towards sustainability measures. This includes the maintenance of a comprehensive database on all sites supported, conducting routine key performance indicator surveys (both for

[11] Figures based on a reduction factor of 35% from planned HH connections for unverified commissioned sites (i.e. sites where no KPI survey has been conducted to date) under the PNPM programme; and 40% reduction factor for (non-PNPM) supported MHP sites that have been KPI surveyed.
[12] Figure based on assumption of minimum one (1) SI per unverified commissioned sites (i.e. sites where no KPI survey has been conducted to date)
[13] Figure based on assumption of minimum one (1) PUE per unverified commissioned sites (i.e. sites where no KPI survey has been conducted to date)

acquiring baseline information and to assess system performance after commissioning) and setting up direct communication between EnDev and rural system operators.

Project progress (overall progress towards outcome target EnDev 2)

EnDev Indonesia has facilitated access to electricity for nearly 70,000 people (approx. 58,000 through MHP and approx. 12,000 through PV), 695 SIs and 869 SMEs. Under the Green PNPM 11 sites (out of 136 supported) remain uncommissioned due to village internal conflicts beyond EnDev's mandate. Despite extensive EnDev support, over 6,000 beneficiaries in these villages are consequently not connected.

EnDev Indonesia conducted key performance indicator (KPI) surveys at 118 MHP sites and 79 PV-VP sites from September 2012 to present. This represents the most comprehensive source of technical, social, economic and environmental data on off-grid mini-grid sites available in Indonesia. EnDev Indonesia has developed quality inspection guidelines for solar PV mini-grids, which have been adopted by DGNREEC as part of its tendering process, contractor negotiations and best practice for technical inspection consultants. Furthermore a SMS-based gateway for facilitating communication directly between EnDev and rural system operators was established as means to provide troubleshooting support.

EnDev concluded its Productive Use of Energy (PUE) pilot with positive results. The pilot project comprised 53 rural businesses in nine MHP sites, which received 112 appliances. The pilot was conducted in collaboration with two local NGOs and results indicated that profit generated by the MHP from electricity sales increased by more than 60%, while availability factor increased (i.e. daily operating times) to as much as 90%. In addition, business profit also increased in most cases.

EnDev supported a comparative study about EnDev and non EnDev sites in early 2013. The results of the study show that the outlook for EnDev 2-supported MHP sites is far better in terms of technical sustainability, while being amongst the top performers for economic and social sustainability.

As a means to present information in a user-friendly format, suitable for rural beneficiaries, EnDev Indonesia has compiled and disseminated a number of posters catering particularly to technology operators. In addition the 3rd version of the multi-media DVD "All About MHP / Semua Tentang PLTMH" was published, comprehensively presenting, in dual language, all relevant materials to MHP development in Indonesia. Collating and presenting knowledge acquired is a core strategy towards developing Indonesia's off-grid electrification sector.

Sustainability and handover strategy

The KPI survey methodology is now a well-established approach, complemented by an extensive and growing database. Upon conclusion of the PV-VP support initiative, the methodology will be presented to DGNREEC (to supplement the already submitted technical inspection checklists) as guideline for future site assessments. Streamlining and strengthening SMS-based communication between rural beneficiaries and a centralised "mentor" to offer technical and administrative guidance is a priority for the next semester. By 2014 the system will be sufficiently robust to be presented to host agencies.

EnDev Indonesia will continue to engage private sector actors (local technology providers, NGOs, credit unions, cooperatives) to anchor acquired knowledge and best practices with.

EnDev Indonesia has expanded its stakeholder collaboration, beyond Green PNPM (which concluded in December 2012) towards a more inclusive, demand-driven approach, i.e. responding to and supporting public and private organisation that pursue rural off-grid electrification. EnDev Indonesia strives to record and present all knowledge gained in an inclusive and user-friendly format. Print, audio/video and digital formats are used extensively, in an effort that valuable experiences and lessons are not lost.

Indonesia biogas

Promoted technology	Biogas		
Project budget	EUR 1,150,000	**Spent until reporting date**	EUR 2,281
Project period	12.2012 – 12.2014	**Reporting period**	06.2013
Lead political partner	Ministry of Energy Mining Resources (MEMR)		
Implementing organisation	HIVOS in cooperation with GIZ		
Implementing partner	Yayasan Rumah Energi (Biogas Association)		
Coordination with other programmes	Indonesia Domestic Biogas Programme (IDBP)(Netherlands Embassy)		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households				people
Cooking/thermal energy for households	20,000	0	1,888	people
Electricity and/or cooking/thermal energy for social infrastructure				institutions
Energy for productive use/ income generation				SMEs

Project strategy and key components

The biogas dissemination approach is based on the establishment of a market for domestic biogas installations and accessories. It envisages a well-informed demand side linked with a capable supply side that can provide quality products and after sales services at competitive prices. Such a market should be able to reach a volume that allows a significant number of constructors and credit providers to maintain a profitable turnover. In addition to the main market actors, government, civil society organisations, and private sector players support market development through policy and implementation coordination, promotion, training and extension, credit provision, R&D and monitoring.

Operating through a decentralised programme structure, local programme teams provide the coordination and support required to facilitate market development. This includes grooming partners, providing trainings, conducting quality control, channelling investment incentives and monitoring. A national programme unit conducts overall programme coordination and liaison with national stakeholders, including government.

In 2013 the current role of Hivos as programme proponent under the carbon mechanism is being devolved to the new foundation and Hivos will become carbon buyer, allowing the foundation to pump carbon revenues directly back into the programme. Over a number of years, Hivos and SNV will gradually withdraw from the foundation, leaving behind a fully localised management unit, responsible for monitoring and implementing biogas activities and with the mandate to sell carbon credits.

The financial sustainability of the programme is predicated on a number of factors. The approach anticipates a reduction over time of external support for farmer investment incentives and programmatic support. As programme functions are institutionalised by local actors, average programme costs per digester will be reduced. Investment incentives will also be gradually reduced, and farmer contributions will increase. At the same time, external funding will in part be replaced by sustainable local funding sources, including carbon emissions fi-

nancing. It is also anticipated that the Indonesian government will provide interim funding to support farmer investment incentives."

Project progress (overall progress towards outcome target EnDev 2)

The intended start of the project was delayed by 2 months due to contractual questions. Further delays relate to the planned government commitment which is now however expected to materialize soon.

It was anticipated that the programme would deliver 150 biogas units per month. Due to the above mentioned delays the start has been slower. The total of 489 units indicates an average monthly production of 82 units. The second semester of this year should show better results as the government will start to disburse its share in the programme.

The interventions consisted so far of:

- Build and strengthen capacity of biogas service providers
- Promotion of biogas among potential users
- Quality inspection and accurate monitoring using comprehensive MIS
- Build appliance manufacture sector and maintain quality

Sustainability and handover strategy

An important sustainability matter is the role of the government in the biogas dissemination approach. While the government would like to see large numbers of farmers supported with a biogas installation, with a high level or even full subsidy, the EnDev biogas programme tries to develop a market-based biogas sector, pushing farmers to invest in the hope that in the future they would like to pay for these services at their own initiative. The cheap or free biodigesters in fact form a potential danger as farmers will become reluctant to invest when hearing that other farmers get it cheaper or for free. It requires strong advocacy to the government to remain on the path of market development, but it is understood that the government at national level also has to listen to regional preferences. The DAK funds (Dana Alokasi Khusus, Specific Allocated Funds), which in selected districts are to be allocated for up to 30% for biogas are an example of local funds, where the national government has to take the local preferences into account. The programme is negotiating with local governments to ensure at least a minimum share contribution from the farmers. Up to now this has been successful in a number of provinces, but not in East Java.

Many of the cooperatives in East Java, which also function as construction partner organisation of the IDBP, find it increasingly hard to identify potential biogas users. Previously they targeted dairy farmers which could relatively easy afford to invest in a biogas digester. Due to the lower milk price nowadays the investment for smaller farmers is a higher barrier. This is hard for the farmer or risky for the cooperative, since the cooperative has to guarantee the repayment. Even though the market is not saturated yet, the cooperatives have to market their biogas services intensively.

The newly established foundation Biogas Yayasan Rumah Energi plays an increasingly important role in enhancing the local management and implementation of the biogas programme.

Further information

The Indonesian biogas programme has presented a biogas user survey which was undertaken in October/November 2012. The results indicate that a majority of biogas users (85%) tended to use firewood instead of LPG before converting to biogas. Hence, the amount of biomass saved through biogas is significant.

Kenya

Promoted technology	Solar / Stoves		
Project budget	EUR 6,800,000	**Spent until reporting date**	EUR 4,995,128
Project period	07.2009-12.2014	**Reporting period**	06.2013
Lead political partner	Ministry of Energy		
Implementing organisation	GIZ in cooperation with SNV		
Implementing partner	Ministry of Energy		
Coordination with other programmes	BMZ: Promotion of Private Sector Development in Agriculture (PSDA)		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	40,000	2,230	35,305	people
Cooking/thermal energy for households	3,730,000	3,401,777	3,415,648	people
Electricity and/or cooking/thermal energy for social infrastructure	600	87	0	institutions
Energy for productive use/ income generation	600	242	0	SMEs

Project strategy and key components

EnDev Kenya facilitates access to clean energy for the rural population through promotion of improved energy efficient cook stoves (ICS) and small solar systems (pico PV) with a pure commercial approach. The aim is to establish and strengthen sustainable and commercially viable supply and distribution models for ICS and pico PV systems.

Focus is on the development of sustainable markets for ICS and pico PV to address the cooking and lighting needs of rural population. Hereby capacity development is key at various levels. Stove producers are trained in the production of quality stoves and marketing of products and services. Consumer awareness of the benefits about available technologies and access to them is increased. Entrepreneurs are trained on technical, marketing and entrepreneurship skills.

EnDev-Kenya supports access to modern lighting through promotion of high quality, affordable and efficient small solar systems. These systems provide good quality lighting and basic electricity services such as mobile phone charging and powering of small radios/entertainment devices. Capacity development is done for last mile entrepreneurs (LME). LMEs in rural areas are also linked to the suppliers of pico PV to ensure availability of solar lanterns in rural areas. Additional programme interventions include linking of entrepreneurs to financing institutions as well as contributions to on-going discussions on policy and regulation while networking with other stakeholders.

Project progress (overall progress towards outcome target EnDev 2)

The programme extended its network by partnering with various implementation stakeholders and explored synergies while adding value to their activities. EnDev Kenya continues to be the source of information and experience with demonstration that the development a pro poor stove market is possible.

The EnDev stove component continues to expand its regional coverage. Six new counties have been included in the current project phase. For established intervention areas with high

stove coverage rates the decision was taken to scale down programme activities. This will test the perceived exit strategy. It is expected that existing stove businesses will continue to offer the services. Monitoring and reporting will be done through a stove association. A study about the effect of the exit is planned. Final decision about the areas EnDev will withdraw from is not finalised.

During the last six months, 171 SMEs and 251 SI purchased 934 stoves. This is about double the amount compared to the previous reporting period as well as double to the average during EnDev 2. This indicates that the special attention the project put on the two customer groups bears fruits. Result calculation is still based on a conservative lifespan of 2.5 years, hence, no additional target achievement can be reported in these two categories this time. The project will continue based on the success of the 1st semester and is eager to achieve the set target.

The solar component is implemented by GIZ and SNV in different administrative areas. A total of 13,926 pico PV systems were sold by entrepreneurs identified and trained by the programme until June 2013. Activities like training, sensitisation and awareness creation were implemented. The number of solar products promoted by the programme also increased from 18 to 27 therefore giving the entrepreneurs and customers a variety to choose from.

A total of 260 last mile entrepreneurs (LME) were trained and introduced to the concept solar entrepreneurship. 50% of them have taken up solar products as a business. The LMEs who did not take up solar entrepreneurship are mainly LMEs with financial challenges to start up their businesses due to inappropriate financing mechanisms for start-ups. Learning from this the selection process of the entrepreneurs has been enhanced in order to increase the uptake of solar entrepreneurship. The programme is exploring financing mechanisms for entrepreneurs e.g. the Youth Enterprise Fund, Women Enterprise Fund, Aphia Plus, too.

Other challenges noted include inadequate local distribution mechanisms to enhance accessibility of products by LMEs, as well as a lack of adequate after sales/maintenance support at the local level. EnDev will work on this by strengthening the capacity of best performing retailers/LMEs to be local distributors as well as by training local technicians on maintenance and repair of the solar products.

Sustainability and handover strategy

A sustainability study was implemented in early 2013.The findings are positive showing a penetration rate of 70% in focal areas and usage rate of 89%. However the maintenance and replacements of stoves scored lower. On both aspects, the programme will continue consumer education to increase awareness about it.

The programme considers the new governance system with focus on counties. Decision making process under devolved county government is seen crucial in supporting the programme implementation, especially with regard to inclusion and funding of energy access interventions in the county development plans. Each county is responsible for development of its community and area. This increases the counties' interest for their involvement as it touches on a number of areas where the county government needs to impact positively.

The national plans to have 10% forest cover are a requirement which is shared at county level and here promotion of ICS is one way to achieve this goal.

The Improved Stoves Association of Kenya (ISAK) remains an important partner. ISAK was formed with EnDev's support; partly as an exit strategy for the project and also to lobby and articulate improved cook stoves (ICS) issues at various platforms, while networking members with investors, stakeholders and users for mutual benefits.

Liberia

Promoted technology	Solar / Stoves		
Project budget	EUR 990,000*	**Spent until reporting date**	EUR 122,634
Project period	05.2012 – 06.2014	**Reporting period**	06.2013
Lead political partner	Ministry of Lands, Mines and Energy		
Implementing organisation	GIZ		
Implementing partner	Rural Renewable Energy Agency, GIZ Development Oriented Emergency and Transitional Aid in Lofa, Agro Action (Welthungerhilfe), Lighting Africa		
Coordination with other programmes	GIZ program "Development Oriented Emergency and Transitional Aid (DOETA); SOS Children's Village Liberia; GIZ Renewable Energy Project Development Programme (PDP); Emergency Power Program (EPP) funded by USAID, Norway, the European Commission, and the World Bank; Liberia Electricity Enhancement Project (LESEP) funded by the World Bank; Gaps Project funded by Norway and others still to be identified.		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	5,500	191	2,243	people
Cooking/thermal energy for households	5,000	1098	1,524	people
Electricity and/or cooking/thermal energy for social infrastructure	10	0	0	institutions
Energy for productive use/ income generation	150	68	150	SMEs

* Including an additional variable up-scaling of up to € 240,000 depending on achievements of milestones

Project strategy and key components

The implementation of the EnDev activities in Liberia started in May 2012 and focuses on five components:

Electricity for households: EnDev supports the development of a market for pico PV products based on local sales agents, shops and outdoor markets. Partners are the solar retailers participating in the Lighting Africa programme, the GIZ "Development Oriented Emergency and Transitional Aid" programme with its local partner organisations such as "Foundation for Women (FfW)", SOS Children's Villages Worldwide and possibly also Agro Action (Welthungerhilfe) and Total. EnDev is providing a limited number of lanterns as start capital for partner organisations. In addition, EnDev provides training to entrepreneurs and local organisations.

Clean cooking technologies: EnDev supports the import of improved charcoal stoves that are successfully disseminated in other African countries. The stoves are commercialised by local retailers for marketing. Assuming that the demand is sufficient, local craftsmen are trained. A marketing campaign will be carried out to create awareness among the households about advantages of modern stoves.

Minigrids: EnDev supports the installation of one pilot minigrid up to a size of 100 kW, also including management and technical training aspects.

Energy for social Institutions: SHS for schools and other social institutions shall preferably be installed in combination with battery charging stations or solar kiosks that offer charging services to the community.

Energy for SMEs: EnDev supports the dissemination of solar dryers for agricultural products such as primarily cocoa beans for small and medium enterprises in close cooperation with the GIZ programme “Development Oriented Emergency and Transitional Aid”.

Project progress (overall progress towards outcome target EnDev 2)

The 300 solar lanterns that EnDev had disseminated to the local NGO Foundation for Women (FfW) in Foya district, Lofa County, have meanwhile been sold by FfW on instalment payment. Not all instalments were paid back up to now, but the remaining amounts are expected to be collected after the coming harvest season. FfW established a revolving fund and reinvested the revenues into new lanterns. Demand for more lanterns is growing, and up to June 2013 FfW had purchased and sold 125 additional lanterns to various other customers. Due to the adaptation of the EnDev pico PV counting system to the system applied by SE4All, the number of persons provided with lanterns increased significantly to a total of 1,524 persons. In May 2013 a first technical solar training has been implemented by EnDev in Monrovia for 40 participants from the stakeholder side.

The cookstove model that had been designed for the cooking situation in Liberia by EnDev beginning of this year had meanwhile been tested in pilot households. Results show that corrosion level of the metal stove grids is severe, probably due to the strong marine climatic conditions in Monrovia combined with poor quality of metal sheets available at local markets. However, households still feel improvement for their everyday life when using the new stoves. Apart from the cost reduction due to the smaller amount of charcoal needed they also report that cooking is now faster, cleaner and more comfortable, since ashes, smoke, and heat extinction are considerably reduced. Aiming at preventing the fast corrosion process, the product development process continues, and the design has been further developed. In June 4 metal workers have been trained during a stove producer training and are now producing pilot stoves for testing. The new generation of the prototype stove is again distributed among selected households for testing. In parallel, EnDev cooperates with a local retail company, who imports and sells stoves from India. 200 stoves have been sold to households in and around Monrovia until end of June 2013. The cooperation with this company still continues. In total EnDev has so far provided 1,524 persons with access to clean cooking in Liberia.

The cooperation with SOS Children’s Village locations in Liberia focuses on stove testing only. The energy audit that has been undertaken by EnDev during last reporting period did not lead to further cooperation with regard to electrification, because 'SOS Children’s Village' faces a budget cut and does not yet start the modernisation of their electricity supply.

The solar cocoa bean dryer model, that had been introduced during last reporting period in Foya district, Lofa county had meanwhile been constructed locally and disseminated among 150 farmer groups of a local farmer cooperative. The dryers are currently facing their first big harvest season, and experience will be documented in the next progress report.

Sustainability and handover strategy

The sustainability of the project activities shall be attained by working through existing structures and by including capacity building activities as for example project management, including monitoring of progress and impacts.

Further information

As an incentive for commitment towards implementation of the project activities, the overall budget will increase by an additional variable budget of up to EUR 240,000, depending on the achievement of predefined milestones. The first milestone has been achieved for ICS. A cost-neutral extension of the project duration until March 2015 is herewith proposed.

Madagascar

Promoted technology	Stoves		
Project budget	EUR 300,000	**Spent until reporting date**	EUR 158,486
Project period	12.2012 – 03.2014	**Reporting period**	06.2013
Lead political partner	In the absence of a functioning government structure, the project works mainly with local leaders and community structures		
Implementing organisation	ADES in cooperation with GIZ		
Implementing partner	Local retailers		
Coordination with other programmes	ASDDG – Action Sud Développement Durable Genève, MNP – Madagascar National Parks, Vozama, WWF Madagascar, GIZ Programme Protection of and Sustainable Use of Natural Resources		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households				people
Cooking energy for households	47,500	0	0	people
Electricity and/or cooking energy for social infrastructure				institutions
Energy for productive use/ income generation				SMEs

Project strategy and key components

The overall project strategy is to increase the local production capacity for improved cookstoves (ICS), and to ensure a sustainable market for ICS in urban and peri-urban areas in Madagascar. Concretely the productivity and number of assembly lines for a factory of the so-called OLI-stoves will be increased. The different types of OLI stoves are built for wood and charcoal combustion. A second key intervention is the establishment of outlets and sustainable marketing structures in new areas of Madagascar, namely the capital Antananarivo. This component includes an awareness campaign for the OLI stoves.

The Swiss NGO Association pour le Dévelopment De l'Energie Solaire (ADES) is active in Madagascar for many years and is highly recognised for its achievements. Since 2009 ADES produces efficient wood and charcoal stoves in Fianarantsoa. The cooperation between EnDev and ADES aims at a substantial increase of ICS sales in the country. EnDev Madagascar is co-funded by own financial resources of ADES, including carbon financing.

Massive deforestation and droughts in past decades have led to a situation in which the prices of firewood and charcoal as well as the stress on the biodiversity have enormously increased. The most areas hit are the vulnerable arid south and west of Madagascar.

The dependency from imports was identified to be one important bottleneck to scale up production and keep ICS available to the poor. Therefore, local production from galvanised sheet-metal should replace importations of buckets from Europe.

Against the background of increasing prices for cooking fuels, the demand for efficient cookstoves continuously increases. The production capacity of 15,000 stoves per year has to be enlarged. An additional production of 10,000 efficient stoves is aimed at within the project period. To achieve the goals of EnDev Madagascar, the infrastructure of ADES needs to adapt in three ways: (1) A second centre for clay core production has to be built in Fianarantsoa; (2) The bucket production in Tuléar has to be increased through installing adequate equipment, and the number of employees increased and educated; (3) A sales centre has to be put in place in the capital city Antananarivo.

Project progress (overall progress towards outcome target EnDev 2)

The contract with ADES was signed on 1 April 2013. Since then major progress has been made in regard of enhancing the infrastructure of ADES in Madagascar.

Production centre in Fianarantsoa: The construction of the new production site for clay cores has started. The terrain was cleared and all the terrain prepared for the construction. The construction of the buildings will start on July 1st and it is planned to finish end of October 2013. The location is 5 km from the city centre of Fianarantsoa, with the sales centre directly along the main road on the way to Tuléar. One of the reasons for choosing this site was to reduce transportation cost. At the end of June 2013, about 100 employees were working on the building site. Once finished it is planned to provide some 50 people a full-time employment. The contract of the director of ADES Fianarantsoa started on 1st June.

Bucket production in Tuléar: The metal workshop is partially installed. In the month of May a technical expert gave the local workers training on the bucket production. The production will continuously be increased in the second half of 2013. To achieve the goal for 2014 to produce all the buckets in our metal workshop in Tuléar (20,000 buckets), further local staff may have to be employed. In September 2013 further metal working tools will arrive from Europe. Only after that the full capacity of bucket production will be achieved.

Sales centre in Antananarivo: The official inauguration of the centre took place on 1st June 2013. Two experienced ADES employees were transferred to Antananarivo for a certain time to pass on knowledge to the new staff in the sales centre. Though officially inaugurated only in June, the centre already sold 3,643 products (emanating from pre-EnDev production). The centre will also facilitate to widen the cooperation with local retailers in Antananarivo.

All three key components of the project are well on track. Since the sales centre in Antananarivo is already fully installed, but the enlarged production in Fianarantsoa is not yet finished, today's production capacity shows to be insufficient, which results in lack of stock in the new centre.

Sustainability, learning experiences and innovation

Producing the buckets locally in Madagascar instead of importing them from Europe leads to the positive effects that overall costs decrease and the employment level in the economically disadvantaged area of Tuléar increases.With the new production fully working in November 2013, ADES Madagascar will directly employ around 200 people. To keep transportation cost as low as possible, the chosen production site of clay cores in Fianarantsoa is only five kilometres from the city centre, and will include a sales centre directly at the main road. ADES provides to its employees above-the-average financial compensation, namely for health and educational costs.

Further information

For the second half of 2013, the political situation in Madagascar is possibly getting worse due to the postponed elections. Although ADES keeps out of any political activity, a negative impact on the project's progress cannot be excluded completely.

Malawi

Promoted technology	Stoves		
Project budget	EUR 250,000	**Spent until reporting date**	EUR 130,341
Project period	12.2012 – 03.2014	**Reporting period**	06.2013
Lead political partner	Ministry of Environment and Climate Change Management		
Implementing organisation	MAEVE project in cooperation with GIZ		
Implementing partner	Stove producers, private sector (PR and marketing specialist)		
Coordination with other programmes	DISCOVER programme (UKAid, Irish Aid, Norway funded), IRTICP (Irish Aid funded), Balaka Sustainable Energy Programme (EU funded), COOPI (EU funded)		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households				people
Cooking energy for households	62,500	0	9,217	people
Electricity and/or cooking energy for social infrastructure				institutions
Energy for productive use/ income generation				SMEs

Project strategy and key components

The overall project strategy is to enhance a financially sustainable market for improved cookstoves in urban and peri-urban areas of Malawi, by strengthening the supply and demand side. On the demand side, activities focus on creating consumer interest in the ceramic firewood stove “Chitetezo Mbaula (CM)” within urban markets. On the supply side, EnDev Malawi enhances the capacities of craftsmen producing the CM stove established by EnDev-ProBEC. EnDev links production and demand by acting as an interface between predominantly rural, informal small scale producers and urban, formal sales outlet chains and organising transportation of stoves to urban areas. Thus, EnDev facilitates the creation of a sustainable distribution system for improved stoves in the major urban and peri-urban areas.

Project progress (overall progress towards outcome target EnDev 2)

The CM stove is the sole technology promoted under EnDev. Between March and June 2013, 4,037 stoves were sold through outlets in the major cities and some district capitals. Blantyre (1,836 stoves) and Kasungu (1,313) had the highest sales figures due to high prices of cooking fuels and good supply chains in these areas.

The project strengthened demand by promotional strategies and nationwide awareness through radio advertising with the aim of creating a positive brand image for the ICS and removing the notion that the stove is only suitable for rural use. The project engaged Hazel Warren, the Malawian representative in the popular TV-show Big Brother Africa. She runs a TV cooking show, which is an ideal channel to promote the ICS product. The project is currently working on placing up awareness billboards in major cities of impact. The project started a sensitisation and sales campaign with road shows in which the promotion team will perform skits on the stove explaining why and how to use the stove and the benefits.

EnDev Malawi has successfully identified outlets for distribution and created a permanent urban market for all participating production groups. By the end of June, the major sales partners were filling stations of the company “Puma” and “Chipiku” stores, a nationwide operating supermarket chain that started to sell CM stoves in their stores in the central

region. Expansion to the rest of the country is expected to happen in August. The procurement of a truck proved the best investment to date, as the key intervention of enhancing capacities of the producers whilst establishing a sustainable transportation system from the production sites to the market was realised.

EnDev has partnered with several NGOs and development organisations in the country, e.g. COOPI, Christian Aid, GOAL Malawi, who have established stove producer groups around the country. Their production groups benefitted from EnDev marketing campaigns. Similar discussions were held with other NGOs and community organisations that currently face sales problems with their stoves and thus slowed down their production. EnDev and the producers are working together towards ensuring that demand is met with a constant supply of quality stoves. Training of new groups is underway and production has already commenced.

To ensure that monitoring figures are reliable and that the disseminated technologies match EnDev performance standards, the project completed a baseline and follow-up study on the stoves in urban areas of the capital Lilongwe.

Sustainability, learning experiences and innovation

The promotional campaign for ICS in urban areas produced a rapid increase in stove demand. While generally desirable and positive, market growth was faster than expected, so that demand was not matched by adequate production capacities at all times, leading to depleted stocks in several sales outlets. Against this background and the foreseeable demand which would be created with upcoming additional promotional events, the project plans to create additional production capacity for ensuring that market demand is satisfied at all times (see Malawi upscaling proposal in this document).

The baseline and follow-up studies on stoves in urban areas indicated a high demand for improved stoves and that uptake shall be easy once marketing strategies have been implemented. The majority of households use a combination of three-stone fire and Kenya Ceramic Jiko charcoal stoves as primary and secondary stoves. Thus, a combination of firewood and charcoal are the main source of fuel. The survey provided a valuable insight into ICS markets for urban dwellers and played a major role in designing marketing strategies. Market research is indeed a crucial element in any marketing project.

Any EnDev stove sold is marked with a serial number identifying the producer group and the date of manufacture. The life span of the stoves depends on stove quality and handling of the stove. It is estimated to be between 1.5 and 3 years, with some stoves lasting for over 7 years. For the monitoring, an average lifespan of 2 years is used. As part of the monitoring system, MAEVE encourages retailers to ask customers to fill out an Emission Reduction Certificate for each stove, containing contact information of the customers and the serial number of the stoves. The certificates are passed on to Hestian Innovation (hestian.com), the first organisation to register the CM stove under the Gold Standard Project 613 “Integrated Biomass Energy Conservation Project – Malawi”. The first carbon revenue from stoves sold under the EnDev project is not expected to come before end of 2014 and will thus not coincide with EnDev funding. The carbon revenue is supposed to sustain the mandatory but costly monitoring of stove adoption and usage beyond the availability of EnDev funding. In addition, the income from certificate sales will keep alive the interface between small scale rural producers and urban sales outlets. Thus, carbon revenue is seen as an exit strategy of the EnDev funding. It will also contribute to the sustainability of the stove marketing as well as creating more production centres and distribution outlets, training of individuals in business and finance for future sustainability, community services around impact areas (for example the implementation of woodlots around production centres) etc.

Further information

Including transport costs, the average price has settled at MWK 800 (Euro 1.86) at wholesale and MWK 1000 (Euro 2.33) at retail level. The end-user prices of the stoves promoted under the EnDev project are in no way subsidised by EnDev or by any other party (Government, donor, charity).

Mali

Promoted technology	Solar PV for Battery Charging Stations and Social Infrastructure		
Project budget	EUR 850,000	**Spent until reporting date**	EUR 104,925
Project period	01.2013 – 12.2014	**Reporting period**	06.2013
Lead political partner	Ministere de l'Administration Territoriale et des Collectives Locales (MATCL)		
Implementing partner	Direction Nationale de Collectivites Territoriales (DNCT) ; Agence Malienne pour le Developpement de l'Energie Domestique et de l´Electrification Rurale (AMADER)		
Coordination with other programmes	Programme Promotion of Local Government (PACT)		

Target (number of beneficiaries)*	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	19,800	3,668	16.211**	people
Cooking energy for households				people
Electricity and/or cooking energy for social infrastructure	180	106	112	institutions
Energy for productive use/ income generation	50	0	0	SMEs

**) target and outcome figures are based on the finalised EnDev (ELCOM) 2 project. EnDev (ELCOM) 3 was approved as a new project without additional targets in order to secure sustainability in the view of the political situation.*

***) Following alignment with SE4All, the outcome of 2013 is calculated differently from that of the last reporting period. Outcome data thus are not comparable to previous semester. With the earlier calculation methodology, reported number would have been approximately 6,000.*

Project strategy and key components

The EnDev Mali project called ELCOM aims to provide sustainable provision of electricity to rural households by PV-driven communal battery charging stations (BCSs) and to rural social institutions (SI) by SHS. In addition, installation of a solar-diesel hybrid mini-grid is foreseen.

BCSs remain property of the commune, are operated on a fee-for-service basis and are contracted to private service providers who are also responsible for operation and maintenance of SHSs in SIs. A fixed percentage of the BCS revenues and part of the fees charged for communal services are deposited into a fund to cover costs for repair and replacement.

New components are the distribution of pico PV devices through BCSs and the set-up of a hire purchase system for solar-batteries and in-house installations

Project progress (overall progress towards outcome target EnDev 2)

Activities this semester focussed on coaching and backstopping and on making ELCOM results more sustainable, most importantly since results in previous semesters showed that BCSs are insufficiently used to generate enough income to properly maintain installations.

In line with earlier recommendations the following actions were taken:

1) A battery leasing system was set up, in collaboration with SNV. So far this resulted in 200 households equipped with a solar-battery powered in-house system
2) Collaboration with Foundation NOTS was established, through which now half the BCSs serve as distribution points for pico PV. With relatively low sales numbers per village, setting up a separate sales point is not interesting. Using BCSs as such is profitable for all involved: in just over a month 660 lamps were sold through 29 BCSs.

3) Comparing registered numbers of batteries with data logger readings confirmed earlier expected underreporting in various cases. Not reporting charged batteries is beneficial for the technicians concerned, as they can subsequently pocket the revenues. This problem was addressed in discussions with the operators and owners.

The third aspect requires still more attention in the next phase, as current operation of the BCSs is not financially sustainable on the long run, partly caused by this underreporting phenomena. Not only should BCS operation be optimised, in discussion with the rural communities, consequences of non-sustainable operation should be discussed, including the rural communities' willingness and possibilities to directly contribute to replacement of PV equipment at SIs when due. In terms of monitoring, more data loggers will be installed.

The **minigrid in N'Tjiba** is still under construction. Pending are a) the rural communes' own contribution, b) final dimensioning and c) an agreement with AMADER on tariff setting. The latter will also be important in EnDev decision making on a potential new phase. Mini-grids could be contemplated, though under the condition that tariff setting allows financially sustainable operation. Other activities planned for a next phase are a) pico PV distribution (expanding current activities) and b) single battery charging stations (i.e. with far less related SI)

A continuation of EnDev also depends on political developments in Mali. Whilst still fragile, the situation at present is relatively calm as can e.g. be seen from the 28 July elections that went relatively smoothly.

Analysis of monitoring data shows the following: For ELCOM 1 rural communes, use of BCSs ranges from 2-43% of the maximum capacity, average 17%, again down from the previous semester's 23%, while 69% is required to ensure financial sustainability. For Elcom 2 rural communes, use of BCSs ranges from 1-65% of their maximum capacity, average 26%, down from 30 % last semester, with generally similar conclusions to EnDev 1.

Comparison of reported numbers with data logger readings shows that in various communes very serious underreporting is happening; in one case it seems that only 10% of charged batteries were reported. Thus, conclusions are hard to draw on the actual use that's being made of the BCSs. As indicated above, BCS management needs strong addressing in the coming semester.

Where in the previous semester apparent 'overreporting' was signalled, in retrospect this was due to a misinterpretation of data concerned. The effect in reality did not occur and as this effect was compensated for during 2012-2 outcome calculation, the then presented outcome was lower than the real outcome.

Following alignment of EnDev outcome calculation with the SE4All methodology that was published recently, the presented outcome data is now are far higher than in the previous semester, yet apart from the correction for overreporting (above). Had the previous counting been applied, in all some 6,000 people would have been reported.

Windfall gain and double energy factors in this project are negligible. Like before a 50% replacement rate is applied, even though savings into the repair fund are below 50% of the level that should have been attained.

Sustainability and handover strategy

Like before, the low (reported) frequentation of the BCSs implies that insufficient income is generated to maintain systems over time. Implementation of the measures described above in order to achieve sustainable operation thus is imperative.

However, it is now estimated that such measures alone may not lead to a fully financially sustainable operation. Subsequently the dialogue with the rural communities concerned will be sought and rural communes will be suggested to themselves contribute to replacement of PV equipment at social infrastructure when due.

Mozambique

Promoted technology	Grid / Hydro / Solar / PicoPV / Stoves		
Project budget	EUR 10,800,000	**Spent until reporting date**	EUR 4,682,828
Project period	01.2010 – 12.2015	**Reporting period**	06.2013
Lead political partner	Ministry of Energy		
Implementing organisation	GIZ in cooperation with SNV		
Implementing partner	Electricidade de Moçambique (EdM), Fundo de Energia (FUNAE), Direcções Provinciais de Energia (DIPREME), MFIs, NGOs, universities, colleges and private enterprises		
Coordination with other programmes	BMZ: Decentralisation Programme (PPFD), Education Programme (PEB), Economic Development Programme BTC (Belgian Technical Cooperation): Rural Energy for Rural Development		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	71,000	46,371	78,844	people
Cooking/thermal energy for households	250,000	0	0	people
Electricity and/or cooking/thermal energy for social infrastructure	26	30	11	institutions
Energy for productive use/ income generation	203	97	85	SMEs

Project strategy and key components

EnDev Mozambique (also known as Access to Modern Energy Services Mozambique (AMES-M)) is involved in grid densification, pico and micro hydro power plants, improved cooking and small PV systems. Through a bottom up approach, the project aims at creating functional structures that can be used as a leverage to influence the government policies.

Grid: EnDev Mozambique aims at continuing grid densification in peri-urban areas in cooperation with the local utility EDM.

Hydro: In the field of micro hydro power, EnDev is working on implementing a commercial operator model in which the operator obtains financing for the hydropower plant and related productive use installations. EnDev aims at capacitating local contractors with the ability to design, install and maintain the hydro installations.

Solar: The project interventions in the pico PV and SHS components aim at working with private sector partners. Importers, wholesalers and retailers of PV products receive training on technical and quality aspects, as well as training on sales, marketing and customer service. Awareness campaigns as well as the establishment of training, testing and research centres complement these activities.

Biomass/Improved cooking: The biomass energy component of EnDev Mozambique uses the new Biomass Energy Strategy (BEST) as reference and guide to coordinate its activities with other organisations. EnDev Mozambique supports marketing, awareness raising and the introduction of high quality stoves that comply with international and EnDev requirements.

Project progress (overall progress towards outcome target EnDev 2)

Grid: In the grid component, a new phase of grid densification is being negotiated with EdM since the first half of 2013. German KfW Development Bank has indicated they would be able to provide large scale credit funding for rapid scaling up.

Hydro: A thorough review of all hydro activities by external consultants has revealed significant shortcomings in the technical, administrative and monitoring processes of the local partner NGO AKSM. AMES-M has decided to not continue this cooperation. A physical spot check of each and every connection has been carried out. The output figures can now be considered realistic and verifiable. This has led to an increase in household connections, as these had been drastically reduced in the last monitoring. For productive use and social infrastructure, the numbers had to be corrected down even further. A commercial bank is interested in the field and their conditions for a loan scheme seem attractive. In the second part of 2013 the first agreements/contracts with this bank are foreseen. This will include the transfer of operator credits originally established in cooperation with AKSM. The Chimoio Excellence Centre Hydro Department (ECHD) will start operation in a new office shared with AMES-M in Chimoio in the 2nd half of 2013. A productive use irrigation project with six ram pumps has started and is in progress.

Solar: The solar training centre at the Instituto Industrial de Maputo (IIM) is operational. A management model has been developed. Since the inauguration, several trainings have been carried out at the centre. AMES-M is developing new training material for the technical and the commercial sales training. The test laboratory at the Eduardo Mondlane University (UEM) has taken shape. The solar testing facility will be the nucleus of a research centre for renewable energy. More than 40 enterprises and PV sales outlets are now cooperating with EnDev Mozambique. More than 250 staff members of the sales outlets and potential PV entrepreneurs have been trained. The firms have experienced significant growth in sales figures in the past monitoring period. However, the high growth in outcome figures for people gaining access to electricity cannot be fully attributed to this growth in sales. It partly relates to the introduction of the new pico PV monitoring system that is consistent with the counting used under SE4All. AMES-M is preparing a cooperation agreement with partner companies to support the establishment of sales outlets in rural areas.

Clean Cooking: SNV has signed a grant agreement with AMES-M in June to promote 40,000 stoves in and around Maputo. Negotiations are underway for dissemination of up to 30,000 locally assembled, high quality stainless steel stoves. To introduce the new technology to the market, it is foreseen that victims of previous flooding disasters will be supplied with the stainless steel stoves at partly or completely subsidised conditions in cooperation with the BMZ-financed disaster management programme. Apart of the flood victims' project, EnDev aims at financial support for the production and distribution chain, rather than directly subsidising product prices. A UEM spin-off foundation developing carbon projects is involved in monitoring, distribution and financing issues. A stove testing facility is under establishment. This facility will be part of the planned research centre for renewable energies at the UEM.

Sustainability and handover strategy

It is EnDev Mozambique's conviction that the chosen strategy of the programme has sufficient security built in for sustained development of the specific technologies in the energy sector. The cooperation with main actors such as FUNAE and World Bank, the involvement of the educational infrastructure (knowledge/advisory base), local banks as well as a specifically capacitated private sector and NGOs, with experience on both community development and implementation level, guarantees a sustained capacity/knowledge base in the country. The strategy of AMES-M for the coming three years will aim at transferring a part of the project's role to the local knowledge centres in Chimoio for the hydro sector and in Maputo for the solar sector, by 2015. These units should be operated partly on a commercial basis.

Extended version of the country sheet is available on the EnDev Wiki.

Nepal

Promoted technology	Hydro / Grid		
Project budget	EUR 4,740,000	**Spent until reporting date**	EUR 1,136,715
Project period	05.2009 – 06.2015	**Reporting period**	06.2013
Lead political partner	Ministry of Energy		
Implementing organisation	GIZ		
Implementing partner	a) Grid: Ministry of Energy / Nepal Electricity Authority (NEA), National Association of Community Electricity Users Nepal (NACEUN) b) Micro Hydro Debt Fund (MHDF): Ministry of Environment, Science and Technology (MoEST) / Alternative Energy Promotion Centre (AEPC), Integrated Watermill activity: SNV c) Productive Use: NACEUN / HELVETAS Swiss intercooperation		
Coordination with other programmes	Nepal Energy Efficiency Programme (NEEP), National Rural and Renewable Energy Programme (NORAD/DANIDA/DFID/KFW), Renewable Energy for Rural Livelihood (WB/UNDP), FMO Develpment Bank, HELVETAS Swiss Intercooperation, SNV		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	240,637	175,048	179,416	people
Cooking/thermal energy for households				people
Electricity and/or cooking/thermal energy for social infrastructure	33	254	304	institutions
Energy for productive use/ income generation	289	441	551	SMEs

Project strategy and key components

EnDev Nepal is based on three main components providing electricity to rural communities: The first component supports the National Rural Electrification Programme (NREP) implemented by the national utility (NEA) for grid extension to communities. EnDev has signed a grant agreement with the utility to partially finance grid extension to 49 Community Rural Electrification Entities (CREE). EnDev provides organisational, technical as well as financial support to the CREEs that manage electricity distribution within the community, and provides all necessary training to employees to operate as an independent village utility.

The second component supports the efforts of remote communities to get access to electricity from micro hydropower plants via a dedicated debt fund enabling them to repay the high upfront costs over a long period of time and encouraging commercial banks to finance projects in the rural energy sector. This component is administered by the Alternative Energy Promotion Centre (AEPC) which is associated to the MoEST. The MHDF has been scaled up by additional EnDev funding of EUR 1.0 million. It is aligned with the new multi donor funded National Rural and Renewable Energy Programme (NRREP) for the energy sector of Nepal, which is in implementation since July 2012. EnDev has taken part in the preparation of this plan alongside other development partners.

In addition, a pilot activity has been started to improve traditional water mills to create electricity, which is implemented by SNV on behalf of EnDev.

The third component aims at promoting productive use of grid electricity to enhance the sustainability of CREEs and is conducted in cooperation with Helvetas Swiss Intercooperation and the National Association of Community Electricity Users Nepal (NACEUN). Hereby, enterprise development and employment generation is promoted through training of personnel with business affinity in various entrepreneurial skills.

Project progress (overall progress towards outcome target EnDev 2)

Grid Extension: Since the last reporting period, 5,142 additional people (857 households) have gained access through a grid connection. This was possible despite of a continuing delay in transformer deliveries from NEA (part of NEA's contribution to the project) to the CREEs. These delays are expected to continue in the near future, because a case is being filed against the procurement department of NEA following a corruption scandal. In total 170,856 people (28,476 HH), 276 social infrastructure facilities and 504 SMEs are provided with electricity in 32 CREEs by now. Moreover 739 HH are reported to be connected through household to household sub-metering connections, partly due to unavailability of energy meters on time, partly due to poor economic conditions of customers that are unable to pay the upfront costs or the minimum monthly base tariff. CREEs have realized the negative impact on their financial condition and are making efforts to come up with a solution.

Hydro: 13 out of the 22 micro hydro plants that received financial support through the Micro Hydro Debt Fund are in operation. Since the last reporting period the MHDF provided mini-grid connection to 9,282 persons (1,547 households). Due to the fact that also other donors contribute to the fund, only 3,670 persons are accountable for EnDev's contribution. 28 social institutions and 47 SMEs also gained access. Repayment by monthly instalments is reported on track. All in all 25,068 persons (4,178 households) benefit from this component so far, out of which 8,560 persons are accountable for EnDev's contribution. Since exact figures on financial contributions by other donors only became available now, figures reported had to be adjusted. The correct figure for last monitoring for total number of persons provided with household energy would have been 170,604 instead of the reported 175,048 persons.

A pilot on upgrading water mills is being implemented by SNV from June till December 2013. If successful, upscaling of this sub-component will be proposed.

Productive use promotion: A baseline study was conducted, and 18 Enterprise Service Providers took part in a training on "microenterprise creation and business development". They are enrolled to identify potential entrepreneurs and to provide training and business services.

Sustainability and handover strategy

Grid Extension: Community electrification efforts in Nepal have faced major delays over the past two years as a result of the dissolution of the Community Rural Electrification Department of NEA in the course of NEA's restructuring in 2011. This also resulted in poor performance of NEA regarding managing the repayments in the EnDev supported revolving fund as intended. Following continuous lobbying efforts of the CREEs and NACEUN, the department has been re-established in June 2013, with firm commitment of NEA to pursue rural electrification efforts based on the CREE model. This is expected to have a positive impact on the speed of implementation of the grid extension activities. Due to the complications mentioned above, CREE commitment towards repayment of the revolving fund that facilitated the electrification efforts has been below expectation. EnDev Nepal is increasing its support to improve management of the revolving fund. NACEUNs positive engagement in terms of supporting CREEs continues and is also likely to continue after phasing out of the project.

Hydro: The implementation and pipeline of MHP sites under the MHDF is significant. The fund has also attracted attention from other donors and programs, and is considered in the documentation of the new single modality energy programme NRREP as good example for credit based rural energy financing. Alignment with this new fund will be closely followed up.

Further information on Nepal: http://energypedia.info/index.php/Nepal_Country_Situation

Nicaragua

Promoted technology	Solar / Hydro / Grid			
Project budget	EUR 5,640,000	**Spent until reporting date**	EUR 2,584,036	
Project period	10.2009 – 12.2014	**Reporting period**	06.2013	
Lead political partner	Ministerio de Energía y Minas (MEM)			
Implementing organisation	GIZ			
Implementing partner	MEM, NGOs, communities, private enterprises			
Coordination with other programmes	Sustainable Management of Natural Resources and Strengthening of Entrepreneurial Competencies (BMZ)			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	49,000	37,780	38,405	people
Cooking/thermal energy for households	125,000	0	0	people
Electricity and/or cooking/thermal energy for social infrastructure	410	79	146	institutions
Energy for productive use/ income generation	415	149	165	SMEs

Project strategy and key components

The Ministry of Energy and Mines (MEM) is coordinating the activities within the national energy sector and is the major partner in planning and technical supervision of hydropower and national grid connected activities. Individual project implementation throughout Nicaragua is accomplished by linking actors such as NGOs, local governments and private enterprises with local communities or cooperatives under cost sharing agreements. Partner organisations are trained in technical and organisational aspects for awareness building and capacity development. The key components of the rural electrification activities are the installation and maintenance of renewable energy systems, such as solar home systems and micro, pico and small hydro power plants. Grid densification and extension is pursued in cooperation with MEM and the distribution utilities ENEL and DISNORTE/DISSUR (DNDS).

Project progress (overall progress towards outcome target EnDev 2)

A total of 38,405 persons, 137 social institutions and 165 small and medium enterprises have been electrified during EnDev 2 until the end of June 2013.

PV for households

During the reporting period, 106 solar home systems were installed with the coffee cooperative “Cooperativa de Servicios Multiples El Gorrión R.L.”. The installations of the three additional lots with the “Asociación para la Diversificación y el Desarrollo Agrícola Comunal (ADDAC)” and “Exportadora Atlantic S.A.” are well underway and will be reported until end of 2013. The partners were accompanied and trained in the acquisition processes for the systems and the contracting of the solar provider. A new approach for the distribution of pico PV products in Nicaragua is in its planning phase with two distinct distribution models.

Micro, pico and mini hydro power plants

The first demonstration pico hydro power plant “El Consuelo” was installed in cooperation with “Exportadora Atlantic S.A”. The site has an electrical potential of 800 W and serves one household with ten people. Another household will be connected by the owner. In this year

the demand for pico hydro plants has dropped significantly due to the crisis of the coffee sector, which was provoked by the occurrence of the coffee rust disease.

In cooperation with the NGO ASOFENIX, the capacity building project in operation and maintenance has been started for the technical training of the local operators of communal micro hydro power plants.

Grid extension and densification

In addition 67 social institutions and 16 small enterprises have been connected in the concession area of the distribution utility ENEL. The verification visits in the communities have shown that ENEL did only report a fraction of the social institutions and small businesses that were connected. Therefore an inventory based on the information gathered during the verification visits in the communities is underway.

Sustainability and handover strategy

Sustainability of achieved access and project outcomes is based on (a) a high own contribution of the beneficiaries for the purchase of the solar home systems, (b) training of the families and local technicians in handling and maintaining the systems and (c) a growing market penetration of solar technology and services throughout the country. The exit strategy is based on gradual reduction of the EnDev subsidy according to the market penetration and cost reductions of solar technology and access to credit financing.

Micro and mini hydro power plants

Sustainability of the hydro power activities is based on the strong ownership and involvement of MEM with its long term technical and management capacity development obligations with the operators, a strong commitment of the communities and users, and financially viable operation models. As individual projects are handed over to the operators and communities, the exit strategy is concentrated on local capacity development for operation and maintenance.

Grid extension and densification

The grid activities are embedded in strong and sustainable national ownership and electricity service structures with a cross subsidised tariff structure favouring rural areas and customers with low electricity consumption.

Further information

The Central American Fund for Access to Sustainable Energy and Poverty Reduction (FOCAEP) has been created. It will be implemented by HIVOS as Administrative Organisation and BUN-CA as the Technical Secretariat. It will upscale the stove activities of EnDev Honduras and EnDev Nicaragua. Its main objective is the market development of improved stoves by strengthening the value chain.

Peru

Promoted technology	Solar / Stoves / Grid / Others		
Project budget	EUR 11,350,000	**Spent until reporting date**	EUR 5,342,054
Project period	06.2009 – 12.2015	**Reporting period**	06.2013
Lead political partner	Peruvian Agency for International Cooperation APCI		
Implementing organisation	GIZ		
Implementing partner	Ministry of Energy and Mines, Ministry of Agriculture, Ministry of Health, Ministry of Development and Social Inclusion, governments of regions and provinces, private companies (especially mining, utilities). Micro Finance Institutions: ADA, MEI		
Coordination with other programmes	Program for Competitiveness – AGROIDEAS from the Ministry of Agriculture; Project for the improvement of the rural grid through a grant fund – FONER; MFIs: Fondesurco; Caja Huancayo		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	175,000	139,760	186,123	people
Cooking/thermal energy for households	310,000	580,590	647,030	people
Electricity and/or cooking/thermal energy for social infrastructure	4,800	2,300	2,810	institutions
Energy for productive use/ income generation	2,600	2,846	5,131	SMEs

Project strategy and key components

Grid extension

EnDev Peru developed the “Safe Rural House” strategy to promote grid connection in combination with safe electric in-house installations, covering three principal aspects: 1) awareness raising in rural areas about the importance of safe installations; 2) training of local technicians on installation, management and access to quality supplies; 3) cooperation with utilities regarding the connection of households to the grid.

Rural electrification with renewables

SHS: The Peruvian Government promotes Solar Home Systems (SHS), installed by private contractors and managed by regional utilities under a fee-for-service concept. EnDev provides technical assistance during tendering and participates in implementation by providing information and education to users, with the aim to improve operation and maintenance (O&M) and hence sustainability of the SHS.

Pico-Photovoltaic Systems (pico PV): EnDev arranged testing and quality assurance for a number of pico PV systems. Alliances have been built with three importers and supply chains are developed at regional level. Local markets are stimulated by awareness raising.

Improved cookstoves

EnDev has surpassed its goal of promoting 310,000 stoves and now aims at knowledge management for its counterparts. This shall promote the sustainability of the programme. Regarding supply, emphasis is placed on the improvement of commercial structures (rural supply points, entrepreneurs’ skills). Regarding demand, the aim is to promote proper use and maintenance of the ICS. To support this, information is broadcasted by radio and an educational programme named “Friends of Energy” has been introduced to primary schools.

Energy for productive uses

EnDev partners with MFIs to promote access to technologies for individual entrepreneurs. EnDev also works with AGROIDEAS (programme by the Ministry of Agriculture) for promotion of producers' associations. Energy is now a standard item in AGROIDEAS' business plans and EnDev helps producers choose the right equipment. Educational and promotional materials have been developed for proper operation and maintenance of the equipment.

Project progress (overall progress towards outcome target EnDev 2)

Grid extension

16 electricians have been trained, who sustain a regular income by selling safe electrical services to the population. This service is promoted via radio, promotional videos, flyers and posters. EnDev formed alliances with electrical equipment companies for a discounted price for high quality materials, sold via regional distributors to populations in rural areas. A strategy document has been edited and utilities can now incorporate and replicate this strategy.

Rural electrification with renewables

SHS: Regional utilities have delivered SHS to almost 5,000 clients, accompanied by information and education material provided by EnDev. Training workshops and certification schemes for local technicians have been developed and inter-institutional communication to improve installation and O&M models has been promoted. Pico-PV: 10 distributors have been trained in rural and urban areas, which thus far have distributed near 700 systems.

Improved cookstoves

At the supply level, seven local entrepreneurs received a special training. They have consolidated business plans which will be implemented in the second semester of this year. On the demand side, eleven "clean kitchen" pilot projects (not only ICS, but also wall paint, compacted floor, shelves, roof window) are carried out in six regions together with local authorities.

The new ISO standard (IWA 2012) is applied for the development of a stove without a chimney for rainforest environments; a single stove that warms the household rooms for the Andean zones; and a portable stove due to enter the Peruvian market.

Technical assistance to SENCICO continues and assistance is also given to a programme of the Ministry of Energy and Mines for 15.000 no-chimney stoves in the Peruvian Amazon.

Energy to support income generation (productive use)

MFIs are extending energy-related products to more agencies. After-sales services are being developed. New local entrepreneurs have been set up as suppliers of improved ovens and solar heaters, and a market study is conducted in order to include pico PV as well. EnDev has supported the creation of an agro-business certificate programme in alliance with AGROIDEAS and the ESAN University in six parts of the country.

Sustainability and handover strategy

EnDev designs strategies to work with public and private institutions at the national, regional and local levels to bring sustainable energy to populations in rural areas. To achieve this, EnDev uses a market approach that develops commercial structures proposing suitable technologies. This means working on: the promotion of products (demand-side); training and research on products (supply-side); and strategic alignment with public policy for promoting investment in the energy market.

Further information

Blog with related publications, photographs and videos: www.proyectoendev.blogspot.com
Magazine by EnDev Peru on energy access: https://energypedia.info/wiki/Amaray
EnDev Peru Online Monitoring System (password available on request): www.endev.org.pe

Rwanda

Promoted technology	Solar / Biogas / Hydro		
Project budget	EUR 12,491,000	**Spent until reporting date**	EUR 3,944,936
Project period	10.2009 – 06.2017	**Reporting period**	06.2013
Lead political partner	Energy, Water and Sanitation Authority(EWSA): Energy Sector		
Implementing organisation	GIZ		
Implementing partner	MINIFRA/EWSA, Private sector (MHP), SNV (Biogas)		
Coordination with other programmes	World Bank, ESME/GVEP, BTC, SNV, KfW		

Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	918,450	8,321	16,550	people
Cooking/thermal energy for households	20,544	8,267	8,730	people
Electricity and/or cooking/thermal energy for social infrastructure	5	0	0	institutions
Energy for productive use/ income generation	30	0	0	SMEs

Project strategy and key components

PSP Hydro: The EnDev Private Sector Participation Hydro Project (PSP) aims at developing a private hydropower sector in Rwanda. To achieve this target, EnDev continues to focus on two key interventions, the development of micro hydro power Plants (MHPP) and the consolidation of the participation of private MHP developers in the energy sector. Through this approach, which has been described in more detail in previous reports, EnDev currently supports six private utilities/MHPPs.

In addition, the project supports the Energy Water and Sanitation Authority (EWSA) and Ministry for Infrastructure (MININFRA) in the privatisation of publicly funded MHPPs. New programmes of other donor institutions such as the World Bank have taken up the private sector focussed approach pioneered by the PSP Hydro project.

EnDev Rwanda is about to start with the implementation of two Result Based Financing (RBF) projects for decentralised off-grid solutions (village grids and pico PV) provided by the private sector.

Biogas: EnDev has been supporting the National Domestic Biogas Programme (NDBP) during its 1st phase (2007-2011). It was implemented by the Ministry of Infrastructure (Energy section) with technical support from GIZ/EnDev and SNV. Since 2012 the NDBP is run by the Ministry without EnDev.

Project progress (overall progress towards outcome target EnDev 2)

The third EnDev supported MHP plant, Musarara (438 kW), started the testing and commissioning in December 2012 and has started production on 10 February, 2013. All three EnDev supported MHP plants have been operating without problems since their commissioning. As a result, so far 16,550 people have been supplied with electricity from hydro power sources.

In 2013, a joint process between MININFRA, EWSA, the rural bank RDB and the regulatory body RURA led to the adoption of a standardised investment process for unsolicited bids by

independent power producers (IPPs). This specifies the roles and responsibilities of all actors involved, from first discussions with the districts to the final generation license, as well as the timelines allocated for each step. On initiative of PSP Hydro, an ad-hoc technical team of hydro power staff was formed in EWSA, which also included other relevant stakeholders like RDB, RURA and MININFRA, to adapt this process for MHP sites. This technical team also discussed and improved standard requirements for feasibility studies, which give clearer instructions to IPPs in the preparation of their application. The newly established Energy Investment Unit in EWSA is taking on a more central role in coordinating all relevant processes in the application of IPPs. PSP Hydro is coordinating closely with this Unit and providing support where needed to ensure sustainability as part of the PSP exit strategy.

In the area of pico hydro, EnDev and GVEP are jointly organising trainings in hydropower scouting/plant design and business management. Based on these BTC will implement more detailed technical trainings, which will be combined with construction of a pilot site.

The growth of the MHP private sector can be clearly observed. Three more projects by new implementing partners are under study and close to financial closure. The companies that already completed a project have all started to work on new projects, either with PSP Hydro, or with other partners. Several other companies expressed their interest in developing a micro hydropower plant with technical and financial support by EnDev Rwanda. In addition, three firms that work with PSP Hydro have started spin-off projects financed by the World Bank, with limited support by the PSP Hydro project.

Recently the PSP project supported EWSA's Energy Investment Unit and MININFRA in tendering out 4 MHPPs to IPPs under a 25 year concession agreement; the tender process was launched in May.

By June 2013, a total of 8,730 people gained access to biogas technology in Rwanda through biogas digesters within the implementation of the NDBP that can be attributed to EnDev.

Sustainability and handover strategy

The successful implementation of three private hydro power projects in Rwanda shows that the technical support and the grant provided is enough to reach technical and financial feasibility for such projects if feed-in tariffs are sufficient (> EUR 0.10 /kWh). As a result of the private sector approach and the strong ownership of developers, individual projects developed by PSP Hydro are expected to successfully operate after the termination of the project in Rwanda. Also, the regulatory and policy framework has considerably improved during the last years. However, there is still a need for more private companies within the hydropower sub-sector to make it sustainable and self-growing.

The establishment of a clear investment process provides more security for companies to follow and to hold the different stakeholders to account. Especially the establishment of the Energy Investment Unit in charge of IPPs is a very positive development, as this Unit is taking on an increasingly strong coordinating role. In the future, this unit might fulfil the role of a one-stop shop for private investors, which in the past was often fulfilled by the PSP Hydro project. However, the slowly increasing number of private companies within the hydropower sub-sector in the country still needs to consolidate their business and assert themselves more to make the sector sustainable.

Senegal

Promoted technology	Solar / Stoves / Grid			
Project budget	EUR 8,500,000	**Spent until reporting date**	EUR 7,998,412	
Project period	04.2009 – 12.2014	**Reporting period**	06.2013	
Lead political partner	Ministeres en charge de l'Energie (MEM)			
Implementing organisation	GIZ			
Implementing partner	Direction de l'Energie, Agence Senegalaise de l'Electrification Rurale (ASER)			
Coordination with other programmes	Promotion of Renewable Energies, Rural Electrification and Sustainable Supply of Household fuels (PERACOD)			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in households	59,700	12,962	14,414[14]	people
Cooking/thermal energy for households	500,000	327,345	415,701	people
Electricity and/or cooking/thermal energy for social infrastructure	549	0	57	institutions
Energy for productive use/ income generation	145	0	0	SMEs

Project strategy and key components

The EnDev Senegal programmes comprises two major components: a) ERSEN dealing with electrification and b) FASEN promoting improved cooking systems. ERSEN is providing technical and financial support to the Senegalese Rural Electrification Agency (ASER) in electrifying rural villages in concessions given out by ASER, through either SHS (small villages), minigrids (villages up to 1000 people) and grid extension (larger villages). Systems are operated and maintained on fee for service basis by four private operators. FASEN focusses on (1) further scaling-up of production and promotion of charcoal and fuel wood stoves (ICS) in the new rural areas of EnDev 2, (2) fostering the local production in the peri-urban areas of the EnDev2 project areas, (3) further increasing the mechanisation of ICS production of successful enterprises in the old EnDev1 urban areas, (4) fostering the quality assurance of ICS and (5) developing and piloting cleaner advanced cookstoves.

Project progress (overall progress towards outcome target EnDev 2)

Under ERSEN 2 another 2,000 people were connected during the last semester, bringing the total to nearly 15,000 or 25% of the target. This number again is far lower than the prognosis for this semester; causes for this are largely similar to last semester:

(a) The operator agreement with the regulatory body SENELEC still hasn't been signed, though progress is made and signing is expected in the coming semester, upon which some 700 households / 8,400 additional beneficiaries will be directly connected.

(b) The contraction for the physically installation of the mini-grids experienced considerable delays; the work was finally completed in June 2013; connection of households in the villages concerned has just started but has not yet resulted in additional beneficiaries.

[14] Reported numbers refer to tier 2 and tier 3 of the SE4All terminology – distribution as yet unknown; following alignment with SE4All, this semester a different counting methodology is used that however has no influence on the reported outcome for Senegal

(c) For several reasons there are differences between operators' performance, with one operator having nearly completed its connections, the other two lagging behind, partly for lack of capacity, partly because of the above mentioned reasons.

Large parts of the overall work have been completed, even though that does not result in reported beneficiaries, as those are only reported once they truly benefit from access to electricity. Provided the SENELEC operator agreement is indeed signed in the coming semester, by 12.2013 connection of some 30,000 beneficiaries in total should still be possible, while connection of another 25 – 30,000 can still be achieved in 2014. Margins by now however are thin and any further delay will imply the project's objective will not be achieved in time.

The outcome of FASEN in the first semester of 2013 has increased significantly as compared to the last reporting period (+27%). The increase was mainly achieved in the urban areas. In Saint Louis, the result has dropped due to a temporary lack of supervision. The reported increase is based on intensive work in the field of production, marketing and communication. In the last six months, more than 360 radio spots on local radio stations were broadcasted to generate interest in ICS, particularly in the new EnDev 2 areas. In parallel, mobile sales events (caravan) and cooking demonstrations on markets were carried out in order to address the demand mobilised by the radio campaign.

While progress in urban areas is satisfactory, and the overall result already has reached 83% of the outcome target, the development in the rural areas is less impressive. Sales in rural areas have even dropped by 26 %. This is a result of difficulties experienced in the provision of services to the producers in these areas. The outsourcing of functions to commercial service providers did not always work out as anticipated. As a result, FASEN is reorganising the support for these areas. FASEN has trained many masons on the construction of mud rocket stoves to address the demand of the poorer rural population. It is assumed that – after the rainy season – these investments will start yielding results in the rural areas.

FASEN and the Global Alliance for Clean Cookstoves supported the national research centre CERER in improving its facilities for testing cookstoves. It is now in the position to carry out stove emission tests which will improve its role in quality assurance.

FASEN has started three initiatives to develop and pilot cleaner cookstoves: (1) religious groups tested high quality large scale cook stove "InStove" which created a lot of interest due to a 85% fuel saving; (2) the "éclair" stove was adjusted to the needs of Senegal (3) the first phase of testing gasifier cookstoves with Typha pellets as fuel has shown that households are capable of using this fuel/stove system. All three approaches will be further elaborated.

Sustainability and handover strategy

Villages electrified during ERSEN 1 are in principle self-sustainable; the service fee enables operators to regularly maintain systems. However, their deposits into the saving accounts for replacement of hardware on the longer term are insufficient to ensure longer term sustainability. Operating cost may be higher than anticipated, the payment rate at app. 80% implies still 20% of potential revenues is not collected, consumption of particularly level 4 customers is higher than anticipated without creating additional revenues, and the other way round tariff setting does not take these factors into account. Further data collection is required to quantify the issue in more detail upon which actions should be taken for longer term financial sustainability. With ERSEN 2 installations not yet operational, handover issues are not relevant yet, though eventually the same issues will be concerned as in ERSEN 1 villages.

Further information

FASEN is promoting improved cook stoves in additional areas under the EU-co-financed regional Programme ProCEAO. Since December 2011, 115,919 people were reached in these areas.

Tanzania

Promoted technology	Stoves / Solar		
Project budget	EUR 2,041,000	**Spent until reporting date**	EUR 1,227
Project period	12.2013 – 06.2017	**Reporting period**	06.2013

Lead executing agency	Ministry of Energy and Minerals			
Implementing organisation	SNV in cooperation with GIZ			
Implementing partner	Stove producers and retailers, food vendors, Solar companies			
Involved bilateral / multilateral programmemes	The Lake Zone Consortium; Agricultural extension society TSAEE; GIZ Programme on Renewable Energy			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	181,970	0	0	people
Cooking energy for households	45,000	0	0	people
Electricity and/or cooking energy for social infrastructure				institutions
Energy for productive use/ income generation	1,000 food vendors	0	0	SMEs

Project strategy and key components

The overall project strategy of EnDev Tanzania is to develop markets, based on sustainable supply chains for improved cookstoves (ICS) as well as for pico PV technology in urban and peri-urban areas in the Lake Zone area. For the latter, a Result-Based Financing scheme (RBF) is being applied, involving incentives to private solar companies. Both project approaches are implemented by SNV in cooperation with GIZ.

The Tanzania Improved Cook Stove (TICS) programme will promote a fixed and a portable ceramic stove called “Matawi” for rural firewood consuming households and a multi-pot charcoal stove for food vendors in the Lake Zone. Key components of the TICS programme are: (i) Diversification cookstove production by introducing new technologies building upon existing technical capacity and potential for the provision of quality ICS products and services; (ii) Provision of targeted business development services; and (iii) Supporting tangible marketing that stimulates and satisfies the expressed needs of consumers and service providers to decision and financing levels.

Market entry of the “Matawi” stove will be focused on utilising the currently known supply channel of stoves – local market retailers selling portable charcoal stoves and domestic ceramics. TICS will support the distribution of the Matawi to retail markets and assist in brokering producer-installer-retailer relations. TICS will provide technical support and train local stove installers in both hearth construction and user training. The installers to be trained will be linked directly to both retailers and producers of the Matawi Stove.

The Tanzania RBF scheme would focus on the Solar Pico-PV subsector with an initial geographic area of the Lake Zone, including Mwanza City. Despite indications of strong potential for expansion of solar to under-served rural and peri-urban areas, there is an absence of a viable distribution chain from urban Mwanza. The intervention has been conceptualised to benefit both solar PV end-users and private sector players.

The key component of the 4-year RBF programme is to facilitate the establishment of a temporary financial product within mainstream banking that is accessible to import-suppliers actively engaged in generating a functional channel to develop the solar distribution chain.

Project progress (overall progress towards outcome target EnDev 2)

SNV began implementation of the TICS Programme in mid-April 2013. First phases of the programme, as per the project work plan, are intended to operationalise TICS and outcome figures have therefore not yet been realised. Activities to date are foundational in leading towards production and marketing in Q3 of 2013 with greater emphasis to initiating rural wood stove production.

SNV has employed the use of Market Intelligence (MI) practices in 2012 that are adapted to capture greater detail on local improved cookstove dynamics. Information has been gathered via direct structured surveys with local actors and analysed in three main areas of (i) consumer-end users; (ii) enterprise; (iii) enabling environment. The use of MI-baseline information has been immediately employed in the rural and urban launch of the programme. Launch sessions combining programme introduction and initial technical facilitation (production process consolidation) have been undertaken as per the programme work plan.

A competitive bidding process was employed in the formulation of TICS task team acting as the main implementers of the programme. Successful agencies to the bid included the Tanzania Society of Agriculture Education & Extension (Rural Stoves); Uitdager Consultancies (Urban Stoves); and the Lake Zone Consortium, an alliance of local business development service providers. These agencies are presently individually contracted for the main body of work for the first half of 2013, reviewed by SNV for their continued work.

Pico-PV Deployment by Result-Based Financing (RBF): The contract finalisation of the Pico-PV programme with SNV was stalled due a few, but important legal questions to be addressed relating to the nature of the RBF approach. However, preparations for the concrete implementation of the programme are under way.

Sustainability, learning experiences and innovation

The production hardware in ceramics has been an essential component to increase artisan productivity and the consistency of production. The programme has undertaken the prototyping of Matawi stove moulds that are employed during the clay shaping process. Past practice amongst ceramic artisans has seen clay stove formation performed strictly by hand. Introduction of the production hardware tools has thus far been very positively received by ceramic artisans and has enabled them to increase quality and double daily production.

Further information

A noted context in the immediate rural market surrounding ceramic artisans (approx. 25-35 km radius) has been the high volume of past local NGO ICS programmes employing poor practices in quality control and non-business oriented approaches to technology provision (i.e. free stove provision). This has created a situation wherein the consumer market surrounding producers is highly uneven. Although pockets of consumers in this locality are viable, higher consumer interest and willingness to purchase have notably improved as distance outside of this radius. The programme has begun product branding to distinguish quality products in the market.

Uganda

Promoted technology	Solar / Stoves / Grid (/ Hydro)			
Project budget	EUR 6,000,000	**Spent until reporting date**	EUR 5,138,288	
Project period	04.2009 – 12.2014	**Reporting period**	06.2013	
Lead political partner	Ministry of Energy & Mineral Development (MEMD)			
Implementing organisation	GIZ			
Implementing partner	Rural Electrification Agency (REA), UMEME (power supply company), Private Sector Companies			
Involved bilateral / multilateral programmes	Promotion of Renewable Energy and Energy Efficiency Programme (PREEEP)			
Target (number of beneficiaries)	**Target till project end**	**Achieved till 12.2012**	**Achieved till reporting date**	
Energy for lighting / electrical appliances in Households	12,500	4,464	29,991	people
Cooking energy for households	600,000	372,996	262,775	people
Electricity and/or cooking energy for social infrastructure	200	144	169	institutions
Energy for productive use/ income generation	100	152	275	SMEs

Project strategy and key components

EnDev Uganda comprises three components: a) improved firewood stoves (fixed and movable mud stoves (ICS)), b) photovoltaic systems and c) grid densification.

EnDev facilitates the dissemination ICS for households with a market based approach offering technical and business skills training as well as promotion and marketing.

Commercial dissemination of PV systems for households, enterprises and social institutions in rural areas is facilitated through technical and business skills training as well as marketing and promotion. In cooperation with local district government and the Peace, Recovery and Development Plan (PRDP), EnDev supports access to SHS for social institutions (SI) also through a direct subsidy.

EnDev Uganda cooperates with the Rural Electrification Agency (REA) in grid densification for electrification of trading centers and surrounding villages following a community based approach. Thereby communities apply for grid connection and become usual customers of the energy supply company afterwards.

Project progress (overall progress towards outcome target EnDev 2)

Implementation of the new ICS approach has started in 2013 with approx. 260 stove builders in 8 new districts in Northern Uganda. New stove builders were trained by the Trainers of Trainers (ToT) according to the Energy Service Providers (ESP) concept. ESPs have the objective to facilitate sales of ICS. Over time they as well have the option to include additional complementary energy products and improved after-sales-services. Thereby, the business of stove building shall be established as a self-sustaining market.

Implementation of the new stove strategy has activated a good number of stove builders. However, the production during the 1st semester 2013 did not really increase compared to the previous semesters. Additionally, stoves of the relatively high number of beneficiaries reached during the first semesters of EnDev 2 come to the end of their lifespan and need replacing. Current stove production however is still insufficient to cover for this replacement or compensate for the stove figure not counted anymore. Consequently the presently report-

ed outcome is lower than last semester. With an increase in production during the 2nd semester this effect should be reversed again. To achieve this, EnDev Uganda will intensify activities to boost the stove market. Planned activities include additional trainings, marketing and promotion campaigns to boost demand, technical quality controls as well as performance assessments to identify stove builders with potential to be upgraded to a higher level of technical and business expertise.

In the 1st semester 2013, over 20,000 people, 15 SIs and 28 SMEs got access to electricity through solar PV systems. Solar market development interventions have followed a two pillar strategy. The backbone is the continuation of the support to rural based solar dealers with technical and business trainings, as well as tailor made marketing and promotion campaigns in the frame of the quality brand "access to solar". In addition, in one region technical quality assessments of installations were done and analysed to prepare for a follow-up technical training in the second half of 2013. The second pillar of the strategy focuses on identifying new solar dealers to join the "access to solar" campaign including companies specialised in import/distribution/sales of quality pico PV systems. So far three new companies have joined. Jointly with Barefoot Power Uganda Ltd. five villages have been electrified in the frame of the "Light Up A Village (LUAV)" project. Preparation for additional LUAV´s is on-going.

EnDev's cooperation with the Office of the Prime Minister (OPM) bears fruits. Districts are allowed now to use OPM district funds to raise their financial contributions to the subsidy scheme for solar systems for SIs. Memorandums of Understanding with six districts have been signed for electrifying 39 SIs. First financial contributions by the districts have been received. Procurement of solar systems is expected to kick-off within the next three months.

Since the agreement with the Rural Electrification Agency (REA) in 2012 to jointly implement four new grid densification projects as community-based approaches, a total of seven projects has been kicked-off. EnDev Uganda has received approval from REA to initiate up to 15 additional ones to establish a project pipeline. While GIZ focuses on initiating the projects and supporting the respective communities, REA will cover most of the infrastructure costs. The rest needs to be covered by a financial contribution by the communities.

EnDev Uganda does follow-up activities on two previously implemented micro hydro power (MHP) projects to ensure sustainability. This includes backstopping of the community operator support of the handover process to REA.

Sustainability, learning experiences and innovation

Sustainability for ICS is ensured by the market based approach whereby the development of market structures is supported. The market forces act independently from the intervention – once established – as no subsidy is granted. Through quality control checks as well as marketing and promotion the reputation of and knowledge about the technology is ensured to create a solid demand by end-users.

The programme focuses on creating a sustainable PV market through a viable network of rural solar dealers, financial institutions and equipment suppliers from Kampala. Quality control and tailor-made technical training as well as promotion and marketing campaigns ensure trust in and knowledge about the products to boost sales.

For the grid densification and MHP projects the legal hand-over strategy is similar. All projects will be handed over to REA being in charge of coordinating and steering the respective work of the local power supply company. For grid densification this means that once connected to the grid, all people reached are usual customers of the power supply company UMEME. With regards to the MHP projects the situation is slightly different as the operators are community-based. In this case, REA will only provide technical and management assistance, if necessary.

F. Up-scaling proposals

Bangladesh

Promoted technology	Solar Home Systems / Pico PV systems / Stoves		
Project period	06.2009 – 6.2017	**Project budget:**	Old: EUR 12,064,000 New: EUR 14,064,000
Target Groups	Rural population of Bangladesh		
Lead Political Partner	Ministry of Power, Energy and Mineral Resources		
Implementing organisation	GIZ		
Implementing partner	Infrastructure Development Company Limited (IDCOL) and 46 private companies (SHS),		
Involved bilateral / multilateral programmes	Renewable Energy and Energy Efficiency / Sustainable Energy for Development – SED (BMZ); GEF, KfW, WB through IDCOL		
Summary of Key Interventions and Outputs	Support the electrification and energy access of approximately 2 million people, through promotion of affordable small solar home systems		

Target (number of beneficiaries)	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	1,478,225	1,976,294	people
Cooking energy for households	680,000	680,000	people
Electricity and/or cooking energy for social infrastructure			institutions
Energy for productive use/ income generation			SMEs
Project Manager	Name: Erich Otto Gomm, email: otto.gomm@giz.de		

1. Situation Analysis

Bangladesh is one of the world's poorest and most densely populated nations. Lack of access to modern energy services is one of the reasons for poverty and low economic development. Almost 112 million (75%) of Bangladesh's 148 million citizens live in rural areas.

The last Household Income and Expenditure Survey in 2010 classified 32% of the country's population as "poor" with incomes below the upper national poverty line. In rural areas this rate is even higher. 17% of the population is considered "extremely poor" (rural: 21%), having incomes below the lower poverty line. The depth of local poverty is reflected in its very low local poverty lines. These poverty lines are defined regionally for 16 regions and are based on local purchase power for basic food and non-food items. The World Bank states that in 2010 a total 113 million people (76% of the population) had an income of less than 2$ per day and 64.3mio (43%) lived of less than 1.25$ per day.

1.1. Energy Situation

About 45% of the 112 million rural dwellers do not have access to grid-electricity and will not be connected to the grid within the next 10 years. Most of them rely on the common inefficient and polluting kerosene based lamps as source for lighting, cheap and short-lived (and environmentally harmful) dry cells for radios and on costly cell phone charging services.

Bangladesh is one of the world's lowest electricity producers. Electricity, critical to economic growth, has reached only about 55% of all households, despite the country's successful rural electrification programme. This number includes households that receive only very few hours

of electricity per day. With the exception of kerosene, commercial fuels are beyond reach for many.

Different types of power plants generate electricity and synchronize it with the national grid. There are some isolated diesel power stations at remote places and islands that are not connected to the national grid. In the Eastern Zone (eastern side of river Jamuna), electricity is generated from indigenous gas and a small percentage through hydropower. About 67.21% of the power plants are fired by gas. Furnace oil, diesel, coal and hydro power are responsible for 21.70%, 6.15%, 2.41 % and 2.65% of the total electricity supply respectively.[15]

In the Western Zone, coal and imported liquid fuel is used for generation of electricity. The fuel cost per unit generation in the Western Zone is much higher than that of the Eastern Zone. Therefore, as a policy, low cost electricity generated in the Eastern Zone is transferred to the Western Zone through the 230 kV East-West Inter connector transmission line.

The installed capacity of power generation in Bangladesh today is about 8,525MW. The demand exceeds the actual electricity production by far. Bangladesh suffers from regular 'load-shedding'. A situation that deteriorates during irrigation seasons, when the demand-supply gap reaches up to 1,500 MW. Domestic and industrial sectors consume about 43% and 44% electrical energy respectively. Out of this, a large part of electrical energy is consumed for lighting. It is estimated that the lighting load alone is about 1,200 MW. Accordingly, the maximum power gap occurs primarily during the evening. A way to manage the evening load is the introduction of energy efficient lights/lighting systems.

Dissemination of solar home systems (SHSs) is being promoted mainly by private sector companies and NGOs; presently, projects are mainly based on the direct-sale approach. This approach is successfully demonstrated by an IDA/GEF-supported project, which provides participating organizations (mostly NGOs) with refinancing funds for micro-financing of SHSs. In the past the concept comprised of a buy-down grant and an institutional development grant for the participating organizations to build capacities for promotion of SHSs in rural areas as well as a service fee from IDCOL for their intense monitoring efforts. The donor financed buy-down grant has declined over the years from 90$ to 20$ now.

1.2 Policy Framework, Laws and Regulations

The Bangladeshi Energy Strategy updated in 2002 is the main document of the promotion of RE It focusses on energy supply in rural areas.

In 2006, GIZ in cooperation with UNDP drafted a new National Energy Policy (NEP) that was intended to incorporate all sector policies. Whereas the NEP is still under consideration, the Renewable Energy Policy for Bangladesh (REP) was adopted by the Government in January 2009.

The REP provides incentives for renewable energy promotion. Some of them are as follows:

- All renewable energy equipment and related raw materials in producing renewable energy equipment will be exempted from charging 15% VAT.
- A network of micro-credit support systems will be established especially in rural and remote areas to provide financial support for purchases of renewable energy equipment.
- Subsidies to utilities for installation of solar, wind, biomass or any other renewable/clean energy projects will be considered by the government.
- Renewable energy project investors both in public and private sectors shall be exempted from corporate income tax for a period of 5 years from the date of notification

[15] http://www.bpdb.gov.bd/bpdb/index.php?option=com_content&view=article&id=5&Itemid=6\ (accessed on September 9, 2012)

of this policy in the official gazette and it will be extended periodically following impact assessment of tax exemption on renewable energy.

- An incentive tariff may be considered for electricity generated from renewable energy sources which may be 10% higher than the highest purchase price of electricity by the utility from private generators.

Furthermore a lot of procedures will be simplified and investment in renewable energy and energy efficiency projects will be facilitated.

The Private Sector Power Generation Policy shall attract private investment for installing new power generation capacity on build-own-operate (BOO) basis.

The vision of the Government of Bangladesh is to provide access to electricity to all households of Bangladesh until 2020. Considering that only 43% of the population has access to electricity in 2011, this vision is almost impossible to be materialized. To reach the government's vision of universal electrification, renewable energy sources, in particular solar energy will have to play a vital role for off-grid electrification.

1.3 Institutional Set-up in the Energy Sector, Activities of Other Donors

Institutional set-up

Bangladesh Energy Regulatory Commission (BERC) is responsible for consumer protection, approval of tariffs and pricing, issuance of generation and distribution licenses, and promotion of competition.

The Rural Electrification Board (REB operations of consumer-owned rural electric cooperatives (PBSs). It performs supervisory and regulatory duties to ensure that technical standards are met and performance is monitored.

Sustainable and Renewable Energy Development Agency (SREDA) will be established soon and will be the focal point for sustainable energy development and promotion, 'sustainable energy' comprising renewable energy and energy efficiency.

Bangladesh Power Development Board (BPDB): BPDB operates most publicly owned generators and some urban distributors; it acts as a single buyer, purchasing from public and private generators and selling to distributors.

Power Grid Company of Bangladesh (PGCB): PGCB is a wholly owned subsidiary of the BPDB, operates the national transmission grid, and schedules grid operations and wheels energy to distributors.

The Dhaka Power Distribution Company Ltd. (DPDCL), Dhaka Electricity Supply Company Ltd. (DESCO), the West Zone Power Distribution Company (WZPDC) are power distributing utilities.

Summit Power Company: A private power company that operates some smaller size power plants.

EnergyPac: A private sector enterprise that produces transformers, energy saving lamps, etc.

Rahim Afrooz: The biggest manufacturer of batteries in Bangladesh. Besides battery manufacturing, it is also involved in the import of solar panels and installation of solar home systems:

Infrastructure Development Company Limited (IDCOL): IDCOL is a government owned company. Although its mandate is to finance all types of infrastructure projects in Bangladesh, its main activity is to manage REREDP project and biogas projects supported by KfW and SNV.

Grameen Shakti (GS): The biggest NGO involved in the dissemination of renewable energy technologies in Bangladesh.

Rural Services Foundation (RSF) is engaged in the dissemination of renewable energy technologies.

Bangladesh Rehabilitation Assistance Committee (BRAC): One of the biggest NGOs in the world and internationally active. The focal areas are wide, in Bangladesh they comprise of poverty alleviation, micro-finance, health, environmental protection, and social empowerment, also through provision of improved energy services with a focus on solar household systems.

Activities of other donors:

Asian Development Bank (ADB): All international donor activities in the energy sector are coordinated by the Local Consultative Group led by ADB. Since recently ADB is providing funds to the rural electrification and renewable energy development project (REREDP) implemented by IDCOL.

The World Bank (WB): The WB is providing funds to the Government of Bangladesh to increase the electricity generation, transmission and distribution capacity. The WB initiated the Rural Electrification and Renewable Energy Development programme (REREDP) and is still financing the credit part of the programme.

Japan International Cooperation Agency (JICA): JICA is helping Bangladesh in the generation of electricity. Currently, JICA is also providing funds to REREDP programme.

Global Environment Facility (GEF): GEF has supported REREDP from the very beginning and plans to undertake projects in the areas energy efficiency and improved brick kilns.

Practical Action (PA): PA is mostly active in infrastructure and livelihood improvement in poor urban areas. As part of their efforts to provide energy access to the poor, they are interested to cooperate with SED (GIZ) in the promotion of improved cook stove as well as related monitoring and evaluation activities.

Swedish International Development Agency (SIDA): SIDA is planning to start improved cook stove activities in Bangladesh. It is not yet decided whether this will happen in cooperation with GIZ.

UK Department for International Development (DFID): DFID has made large funds available for electrification projects. They have indicated strong interest in SHS/SSHS, PicoPV as well as improved cook stove activities. Besides agreeing on 2 projects with GIZ, they have made funds available to support another 1.000.000 SSHS.

Kreditanstalt für Wiederaufbau (KfW): Besides their efforts in rehabilitation of old power plants and grid efficiency, KfW has in the past been a strong promoter and supporter of the SHS and SSHS dissemination under IDCOL but now provide no further support for SHS.

2. Planned Outcome

Energy Service Segment	Old target	New Target
Energy for Lighting & Electric HH Appliances	1,478,225	1,976,294
Cooking Energy for Households	680,000	680,000
Electricity and/or Cooking Energy for social infrastructure		
Energy for productive use/ income generation		

3. Project Approach and Selected Technologies/Services

3.1 Small Solar Home Systems (SSHS)

GIZ initiated the dissemination of SSHS and convinced IDCOL to adopt the technology in 2007. Subsidies for SHS have by now been phased out. While the subsidy support for SSHS was originally intended to be phased out as well by end of 2013, IDCOL and DFID decided to continue the subsidy-support of these systems without fixing a planned phase out date, as affordability is still the main barrier for poor households and SSHS show a better penetration in poorer target groups. The total monthly sales numbers of SHS and SSHS are now beyond 80.000 systems per month and still increasing, SSHS hold a share of over 50% of the dissemination.

The SSHS are installed by partner organizations (POs) of IDCOL. The SSHS are acquired by individual households or small/micro enterprises through micro-financing schemes offered by the POs. Overall the distribution network now comprises 46 organizations with a total of over 4,000 shops, selling S/SHS. Awareness raising and promotion for the systems is carried out by the POs as part of their normal business activities. Business development services are provided by IDCOL. They also monitor the activities of partner NGOs and ensure the quality of systems. IDCOL provides POs with the market development grants for customers and organizes and manages the funds for the credit component of the scheme.

The estimated technical lifetime of the solar panel of a SSHS is about 20 years, for the battery five years and for the charge controller one year. Maintenance and after-sale service are provided free of charge within the first three years after purchase. During this time the systems are regularly checked by PO staff when collecting the monthly instalments. After the three years payback period, maintenance is provided by the POs for a monthly fee. As SSHS users are owners of their systems, motivation to keep the system running will be high.

The projections for the market especially for SSHS indicate a further increase in demand. EnDev will continue to support the promotion and dissemination of SSHS in BGD together with IDCOL and help to keep these systems affordable for the poor and energy starved target groups. More than 200,000 S/SHS have been supported from EnDev funds so far, more than half of those are SSHS with panel sizes between 10-29Wp.

IDCOL's target until end of 2016 is 6,000,000 SHS (including SSHS). The project will continue to support the grant element of the scheme to support the dissemination of another 110,682 SSHS (at a household size of 4.5 equals 498,069 people).

The existing financing structures provided by IDCOL will be used for provision and management of refinancing loans, and the micro-finance organizations (NGOs), which are already experienced in promoting and financing of SHSs, will be involved in promotion and selling of SSHS. Funds for refinancing will be provided by IDCOL, whereas the proposed partnership project will only provide the buy-down grant component. This project will be implemented by IDCOL and their 46 partner organizations from the private and NGO sectors.

The small solar home systems (SSHS) and upcoming pico PV systems/solar lamps (SL) will provide subsistence electric light to households. The cost of a solar lamp would be within the reach of most of the households of Bangladesh and even the extreme poor will be able to afford this if a proper financing mechanism is in place. The envisioned picoPV project will promote solar lamps and create a market that is expected to amount to over 10 million households in the next five years. Together with the reduction of the indoor air pollution in the households through replacement of kerosene based lamps through the solar appliances and the dissemination of improved cooking stoves the EnDev activities are well consistent with the national policies mentioned above.

3.2 Experiences and lessons learnt from EnDev 1+2

Experience with SSHS during previous phases is quite satisfactory. It has created a demand of SSHSs within the not-so-well-off section of the rural population. In fact, more than 50% systems of the current monthly dissemination are SSHS. A large section of people, especially the poorer section of the population cannot afford SHS (e.g. 50 Wp), but can afford the SSHS. A subsidy of 20$ reduces the prices significantly. Experience in the existing SSHS market shows that the buyers of SSHSs are aware of and can mostly afford the recurrent costs for replacement of system components, thus after the sale of a SSHS there is no further need for financial support.

3.3 Risks for Implementation

Following risks may influence the implementation of SSHS and solar lamps during EnDev 2:

As the dissemination of SSHS in Bangladesh is already in progress and the monthly output is still increasing, no mentionable risk can be identified that would lead to a reduced output.

Risks arising from political developments are minimal. Due to upcoming elections regional unrests can occur. In the last months such events have led to delays in delivery in certain regions but commercial activity took up again quickly thereafter. Political support after a potential change of government will continue and is not a threat to the project.

4. Expected Impacts of Project Intervention

The SSHS project facilitates access of low income households to basic electricity and thus:

- replace fossil fuel (kerosene) lamps through modern electricity from renewable sources,
- provide bright and better light for education in the evening hours,
- provide more security for household members, especially women and children
- help to save money for kerosene or candles,
- help to save time needed for purchasing kerosene,
- improve indoor air quality and health by avoiding burning of kerosene.

5. Budget

		EUR
1	Human Resources and travelling	100,000
2	Equipment and Supplies	20,000
3	Funding Financing Agreements/Local subsidies	1,700,076
4	Other direct costs	40,000
5	Total direct costs (sub-total)	1,860,076
6	Mark up costs/administrative overheads/imputed profit/	139,924
7	Cost price	2,000,000

Bolivia

Promoted technology	Stoves / Pico PV / SHS / grid		
Project period	Old: 10.2009 – 12.2014 New: 10.2009 – 6.2016	**Project budget:**	Old: EUR 9,400,000 New: EUR 11,400,000
Target Groups	Rural households of Bolivia		
Lead Political Partner	Vice Ministry of Electricity and Alternative Energy (VMEEA)		
Implementing organisation	GIZ		
Implementing partner	Vice Ministry of Electricity and Alternative Energy - Programme of Electricity for a decent Living (PEVD)		
Involved bilateral / multilateral programmes	Inter-American Development Bank (IDB)		
Summary of Key Interventions and Outputs	20,000 new grid connections for households in rural poor areas of the country. Local capacity development: • training of local technicians for safe indoor electrical installations. • local training of technicians in grid connections in alliance with the utility. Awareness creation: • local workshops and print material distribution to households for electrical safety and warnings regarding the use of home appliances. • local promotion of productive uses of electricity. Extension of all other components (stoves, Pico PV, SHS)		
Target (number of beneficiaries)	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	300,000	400,000	people
Cooking energy for households	212,000	237,000	people
Electricity and/or cooking energy for social infrastructure	2,700	2,700	institutions
Energy for productive use/ income generation	11,200	11,200	SMEs
Project Manager	Name: Jaime Sologuren, email: jaime.sologuren@giz.de		

1. Situation analysis

Bolivia's efforts to improve energy services for the poor have been quite intensive in recent years. However, it should be noted that while the scaling-up of energy programmes in rural areas is particularly desirable, it is also very costly due to the difficult geographical conditions and the low population density (resulting in a high relevance and a low cost efficiency).

Bolivia has a complex social, ethnic and cultural situation. The majority of the indigenous population (particularly women and children) suffer from high levels of poverty and social exclusion. After years of weak economic growth, the Bolivian economy has been showing signs of recovery since 2003. However, national poverty reduction policies need to be strengthened and implemented effectively in order to achieve a fairer distribution of the benefits of growth for the most vulnerable sections of the population.

1.1. Energy Situation

The electricity system in the country is divided. On the one hand there is the national grid which has a capacity of about 1.5 GW which serves the major urban centres of the country. On the other hand there are isolated systems located in rural areas serving smaller cities.

Despite the big efforts of the past years in terms of rural electrification, still approximately 47% of the rural population has no access to electricity.

1.2. Policy Framework, Laws and Regulations

Under the current government Bolivia has seen profound changes in many policy fields. The energy sector is undergoing huge changes with the introduction of two new laws that will change important aspects of the sector regarding electricity and hydrocarbons. This introduction of a new regulatory framework, although initiated, is a process that will need a lot of time in order for the required norms and regulations to be elaborated and promulgated. However, the tendency is clear: a move towards a more centralist state with programmes under direct execution of the central government and its ministries.

The new state constitution establishes the right to universal and equal access to electricity for any citizen. It is the responsibility of the State, at all its levels, to provide the basic services, by means of public, private, mixed (public and private), cooperative or community entities. The services supplied must meet with criteria of accessibility, continuous supply, quality, efficiency and fair charges; with public participation and social control. New grid extensions are a being planned and partly or entirely financed by the regional governments or municipalities.

1.3. Institutional Set-up in the Energy Sector

In Bolivia, the Vice Ministry of Electricity and Alternative Energy (VMEEA), within the Ministry of Petroleum and Energy (MHE), is in charge of establishing policies and designing the regulation for the electricity sector. The VMEEA and the Viceministerio de Desarrollo Energético (VMDE) are in charge to develop policies to promote energy efficiency and renewable energy. A working group of VMDE and VMEEA, the "Unidad de Desarrollo Energético", develops the National Plan for Rural Electrification.

The Autoridad de Electricidad (AE) is responsible for applying the regulation set by the VMEEA and it grants and supervises concessions of electricity operation and maintenance. It works with the “Comité Nacional de Despacho de Carga (CNDC)”, which coordinates the activities of the actors in the three markets (generation, transmission and distribution) under the interconnected system. The CNDC consists of delegates of the relevant companies in the sector.

The electricity sector in Bolivia was privatized in the early 1990s and was unbundled into generation, transmission and distribution. However, with the current government, all companies in the market are being nationalised and state controlled by the national electricity enterprise called ENDE. This change created insecurity for private investments into the electricity sector.

1.4. Major Donor Activities

The Programme “Electricity for a decent living” (PEVD) of the National Government has the ambitious plan of universal access to electricity in the country by the year 2025. This objective is supported by a loan from the Inter-American Development Bank (USD 60 million), which is now under implementation. The main objective of the loan is to increase the availability of electricity in the country by building new low, medium and high tension lines. However, it does not consider the connection fees for the end user which impedes the majority of the rural poor in getting access to electricity. This results in grid lines to which only few of the potential customers are connected.

EnDev is closely cooperating with the national “plan de universalización” (DS 29635), executed by PEVD, currently financed by a loan from the Inter-American Development Bank (IDB), which plans to install 30,000 new grid connections in the country until 2016. The present up-scaling proposal of EnDev is complementary to the IDB strategy as the final access costs to the households were not considered in the initial programme design.

2. Planned Outcome

Energy Service Segment	Old Targets	New Targets
Energy for Lighting & Electric HH Appliances	300,000 people	400,000 people
Cooking Energy for Households	212,000 people	262,000 people
Electricity and/or Cooking Energy for social infrastructure	2,700 institutions	2,700 institutions
Energy for productive use/ income generation	11,200 enterprises	11,200 enterprises

3. Project Approach

EnDev-Bolivia will continue to work along its successful strategic orientation. The intervention is demand-driven and based on the principle of mobilisation of local resources with the direct participation and involvement of beneficiaries and/or implementing partners at different government levels. Advice focuses on planning, implementation and monitoring. The project’s main activities continue to focus on co-financing energy access and development of local capacities with the following key components:

- Design of policies and co-financing mechanisms for better access to modern energy.
- Creation and promotion of markets (stoves, Pico PV)
  - Support producers / retailers / providers/ installers in the provision of modern energy products and services (training and advising)
  - Support awareness and public relations campaigns about indoor air pollution, productive energy use, proper use of natural gas and safe domestic electric installations.
- Facilitate and support networking between stakeholders in the energy sector with a multilevel approach.

This strategy has been successful in the past and EnDev-Bolivia proposes to continue until 06/2016. The additional budget of EUR 2 million will assure implementation on current levels and achievement of objectives until 12/2015. Afterwards, EnDev-Bolivia will drastically reduce its implementation activities and will shift the focus to ensuring sustainability for the remainder of the project period. In case new additional funds would become available in 2015, implementation would continue and additional outcomes would be generated.

3.1. Energy Technologies and Services Promoted by the EnDev Project

EnDev fosters access to electricity for lighting and household appliances through the promotion of safe indoor electrical installations and supports the dissemination of improved cookstoves.

3.2. Approach to Provide Electricity to Households

In alliance with the electricity distribution utilities, EnDev has been financially supporting the national “plan de universalización” to decrease the connection fees for rural poor households. This strategy proved to be effective and was included in the national fund’s policy.

It is expected that 20,000 new grid connections will be realised in coordination with the VMEEA and the IDB loan in the departments of Cochabamba, La Paz, Oruro, Chuquisaca and Beni under this proposal. The IDB loan is being used to 70% to extend the low, medium and high tensions lines in the country, the other part is used for generating electricity e.g. isolated mini grids or Pico PV. While there are several alliances between IDB, VMEEA and EnDev, the proposed activities in this up-scaling will be within the scope of the grid extension component of the loan. A coordination board will be set up for all follow-up and related implementation activities between IDB, VMEEA and EnDev.

As parallel activity it is planned to work together with the VMEEA and the Autoridad de Electricidad (AE), in order to provide technical assistance at policy level with the objective that all utilities and regional governments include electricity meters as an investment component into their new grid extension programmes. This will significantly decrease the up-front cost that rural homes have to pay and, if successful, will substitute the current EnDev subsidy.

It is intended to organise trainings for local technicians about safe indoor electrical installations within the communities that will be supported. In alliance with the utilities independent technicians will be trained in grid connections, which later can be hired by the utility. The activities will be accompanied by awareness raising (local workshops and print material) for end users in order to call attention for safety issues regarding the use of home electrical appliances.

This strategy considers not only the supply of electricity but also private sector participation, coordination with other donors and transparent subsidy allocation (in the case of households connections to the grid: 20% EnDev and 80% users) among others. EnDev will also work with the central government in order to promote a better understanding and expression of local demands for access to electricity as well as establishing adequate co-ordination mechanisms with other sectors and development programmes.

3.3. Approach to Provide Clean Cooking Technologies to Households

EnDev's approach will remain largely the same with the overarching objective of increasing the number of people with sustainable access to modern energy while combating poverty and climate change, as well as promoting private sector development.

The key intervention of EnDev is the creation of a viable market structure for improved biomass stoves by stimulating demand and promoting local supply. In terms of strengthening supply, EnDev will continue to establish and reinforce alliances with different players. The objective is to continue the promotion of improved cookstoves through a market approach in which suppliers are contracted to introduce their work in the field. Local subsidy agreements will be signed with these NGOs or enterprises. They will receive the chimney and the grill (rack) from EnDev. Payments will only be made once the stove is installed and physically verified by EnDev. Contracts will include:

- Selection and training of local "Malena stove" builders (men or women) at community level that can build the stove. The training will include maintenance tasks which will be offered by the same stove builders in the future.
- Household training for use and maintenance of the stove, good cooking practices, proper lighting, cleaning, etc.

In parallel, EnDev will continue to train local technicians on replacement of the chimney and metal rack. EnDev will also work with local manufacturers to further build capacity on the design of Malena stoves, especially the local provision of the metal chimney and rack. Promotion and awareness activities are part of the support to local technicians with the objective to stimulate rural demand for improved cookstoves. The support to the sales structure includes the technicians already trained by EnDev, linking them with the local chimney and rack providers.

EnDev will also support other types of stoves produced by small entrepreneurs (metal stoves) under the condition that they pass the required standards established under the Norm N° 83001. It is expected that this will foster innovation and, at the same time, attract new entrepreneurs to the stove business. Every single stove model shall be tested and certified before sale in the stoves testing centre established with support of EnDev at the public University of San Andrés in La Paz..

On the demand side, EnDev will continue to work closely with rural communities where high demand has already been identified. Promotion of the technology (benefits and advantages), awareness creation and support to the suppliers in order to be able to fulfil the demand will create positive framework conditions for massive distribution of improved cookstoves.

EnDev will continue capacity development on cookstoves within counterparts at different levels and with implementing partners within national, regional and municipal governments. Knowledge on the advantages of improved cookstoves will spread, thus also contributing to higher demand.

EnDev will continue to monitor, evaluate and report within the monitoring and evaluation system. It is currently planned to migrate this system to a regional EnDev database.

It is important to note that this strategy was designed and will be implemented in close cooperation with the joint World Bank / VMEEA programme which is expected to begin 1st semester of 2014. Thus, duplicity or overlaps are avoided.

4. Expected Impacts of the Project Intervention

Impact	Possible indicators
Environment	Green House Gas mitigation by reducing kerosene combustion and use of candles.
Health	Decrease in occurrence or air pollution related (respiratory) diseases and consequential higher average productivity. Increased perceived indoor (e.g. fire accidents) safety
Poverty / livelihood	Access to telecommunication and TV decreases the sense of isolation and increases living conditions, it enables access to market information necessary for strategic planning and sales. Increased income generation for trained technicians.
Education	Trained technicians/electricians Better knowledge among family members about electricity.

5. Budget

		EUR
1	Human resources and travelling	1,156,000
2	Equipment and supplies	50,000
3	Funding financing agreements/local subsidies	470,000
4	Other direct costs	68,000
5	Total direct costs (sub-total)	1,744,000
6	Mark up costs/administrative overheads/imputed profit	256,000
7	Cost price	2,000,000

Ethiopia

Promoted technology	Solar / Micro Hydropower / Stoves		
Project period	01.2010 – 06.2017	**Project budget:**	Old: € 12,687,000 New: € 15,467,000[16]
Target Groups	Rural and Semi-urban Population of Ethiopia		
Lead Political Partner	Ministry of Water and Energy (MoWE)		
Implementing organisation	GIZ		
Implementing partner	MoWE, Ministries of Agriculture, Health, Education, Environment & Forestry, and Trade; Ethiopian Electric Agency (EEA); Environmental Protection Authority (EPA); Regional Governments/Agencies/Bureaus/ of Energy, Education, Health, Agriculture; Universities / Institutes of Technology (IoT) / Technical Vocational Educational and Training Units (TVET); Chamber of Commerce; Solar Energy Development Association of Ethiopia (SEDA-E); Ethiopian Hydro Power Society (EHPS); Regional (Development) Associations; private solar energy installation & maintenance companies; other private companies in the energy sector value chain; NGOs, Women's Associations; Assistance to Health System Expansion (AHSE); Community Development Service Association (CDSA), Oromia Credit and Saving Share Company (OCSSCO)		
Involved bilateral / multilateral programmes	**DE:** Sustainable Land Management (SLM) Programme, Education Program, National Quality Infrastructure (NQI) Programme, Urban Governance & Decentralisation Program (UGDP); **NL:** Biogas Programme; Horn of Africa Regional Environmental Centre (HoA-REC); **WB:** Energy Access and Electricity Access (Rural) Expansion; Lighting Africa; GPOBA; **NO:** Energy+; **IE:** Health Care Programme; **CIF:** SREP-Ethiopia Investment Plan		
Summary of Key Interventions and Outputs	**Component 1:** Electrification of 26,000 households with PV equipment (lanterns/lamps, small PV systems) and hydropower **Component 2:** Dissemination of clean cook stoves **Component 3:** Electrification of 150 social institutions (health centres, schools, community centres) with PV systems and hydropower (upscaling) **Component 4:** Dissemination of clean cook stoves among 650 social institutions (upscaling) **Component 5:** Electrification of small and medium-sized enterprises with solar PV systems and with hydropower and providing clean cook stoves to small and medium-sized enterprises (in total 2,700 enterprises) (upscaling) **Component 6:** Policy, Strategy & Communications		
Target number of beneficiaries	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	35,000	130,000	People
Cooking energy for households	725,000	925,000	People
Electricity and/or cooking energy for social infrastructure	450	800	Institutions
Energy for productive use/ income generation	1,000	2,700	SMEs
Project Manager	Name: Dr. Gerd-Henning Vogel, email: henning.vogel@giz.de		

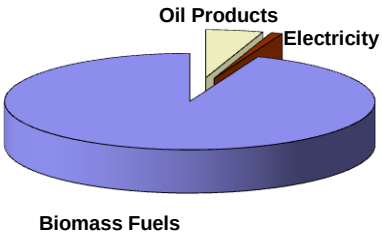
[16] Old funding + 1,800,000 EnDev Global Basket + 1,000,000 Irish Aid

1. Situation Analysis

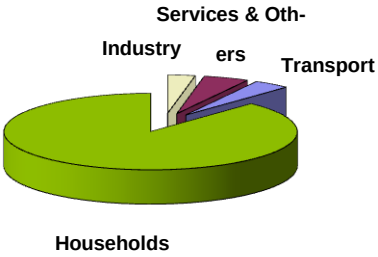
1.1 Energy Sector Situation

Per capita energy consumption in Ethiopia is among the lowest in the world. However, the energy requirements of the large and fast growing population and the fact that the major proportion is supplied by traditional energy sources have serious implications on the natural resource base. The vast majority of Ethiopia's energy needs are met from local natural resources, mainly from biomass. Looking at biomass supply and demand balances, there is a huge and constantly widening gap between demand and sustainable fuel wood supply. Currently the estimated demand for fuel wood is five times the sustainable supply.

Final Energy Consumption by Fuel Type



Final Energy Consumption by Sector



In the household sector, about 85% of all households use wood-fuels (firewood, charcoal), about 10% other biomass (mainly animal dung and agro-residues), about 2% kerosene and about 1% electricity as energy source. In rural areas, the main energy use in households is for cooking and a small share for lighting. Out of the 87% wood-fuels used for cooking, almost everything is firewood, with a tiny 0.2% share for charcoal. Other biomass fuels provide 12%, whereas the use of modern cooking fuels such as kerosene, butane gas and electricity is uncommon for cooking in the rural areas (0.4%). In urban households their share is higher at approximately 15%, but also there wood-fuels are the major cooking source at approximately 76%, thereof 76% firewood and 9% charcoal.

Most of the forests in Ethiopia, including the Forest Priority Areas, are already in a stage of degradation. The natural forest cover of the country has diminished to less than 3% of the total land area within a few decades, and the rate of depletion is estimated at 150,000 to 200,000 ha per annum. Dense and homogeneous patches of forest cover remain only on steep slopes and in remote areas. The expansion of farmlands and pastures and the dense population heavily drain on the forest resources.

The demand for wood products, especially fuel wood, is expected to increase at about the same rate as the population, i.e. around 3% annually. Without substantial mitigation measures, major fuel deficits are likely to result. Already there is a notable fuel deficit in certain areas. In the Tigray region, for example, fuel-wood has become so scarce that households are digging up roots for fuel. Inadequate supply of fuel-wood as well as inefficient use for cooking has a direct negative impact on rural women's health and workload.

At household level, access to the traditional energy resources is becoming increasingly difficult. In the majority of the rural areas, women and children spend an estimated 5 to 6 hours a day to collect fuel wood and in town centres where fuel wood is purchased, energy expenditures account for about 20% of the household expenditure. These national figures disguise regional differences. The situation is very severe in the highlands of the country, which constitute about 33% of the country’s surface area and is inhabited by more than 75% of the population, and is specifically acute on the northern highlands.

1.1.1 Energy Situation of Rural Health Centres in Ethiopia

Starting in 2006, the Ethiopian Federal Ministry of Health (FMoH) in collaboration with regional governments constructed about 3,200 health centres (HC) all over Ethiopia to provide a better health service to the rural population. Health centres mainly provide basic curative health care services but also support governmental initiatives like the Health Extension Program. Acting as referral and technical assistance centres for health extension workers they are clustered to provide service for 25,000 people each. Accordingly, a standard is set to the service they deliver, the number of professionals employed as well as type and number of equipment.

A reliable water and electricity supply of the new HCs is an essential precondition for the proper operation and an appropriate supply of service, but only around 50% of them are connected to the national electricity grid and/or have access to clean water.

1.1.2 Electricity Sector

Ethiopia still has one of the lowest annual per capita electricity consumption in the world (52 kWh per year compared to 107 kWh for Sub-Saharan Africa and 2,782 kWh worldwide). The total installed electric power generation capacity in Ethiopia is about 2,200 MW, thereof approx. 90% hydro, 6% diesel, 4% wind and 0.2% geothermal. While approx. 52% of the population has access to the electric power supply (defined as living in a kebele where a distribution line is passing through) only about 16% of the population actually has electricity supply in their dwellings. Due to the overloading of the transmission and distribution networks, large new commercial and industrial customers are difficult to be connected.

The vast majority of the people with access to electricity are supplied by the Government-owned Ethiopian Electric Power Corporation (EEPCo). EEPCo has about 2.0 million customers, most of them in Addis Ababa and other medium to large towns connected to the national grid. There are very few rural consumers (less than 2%) connected to the grid. Apart from the low per capita income, other main constraints for increasing access have been a shortage of investment resources because of low tariffs over a long period of time and limitations in management and technical expertise. Low levels of access to infrastructure services, including to electricity, is a major barrier to economic development and to the provision of social services in towns and rural areas. EEPCo's limited capacity to speedily connect large new consumers is thus constraining commercial and industrial growth. Further, the poor quality and instability of the existing supply service, characterised by voltage levels far below nominal, frequent outages and delays in restoring supply after a breakdown is an ongoing problem.

In the field of power generation, especially hydro, wind and geothermal as well as coal and natural gas as future options, the private sector involvement is highlighted as essential in the power sector development strategy. There are already some ongoing activities and joint measures between EEPCo and the private sector regarding this issue. So far, despite some enabling legislation under preparation, independent power producers (IPP) are politically not encouraged and still almost absent in Ethiopia. Only traditional Engineering, Procurement and Construction (EPC) contracts and Build-Operate-Transfer (BOT) management models are currently accepted. This means that EEPCo is the owner of the generation plants while private management over a contractually agreed period is permitted.

1.2 Policy Framework, Laws and Regulations

1.2.1 Ethiopian Energy Policy and Plans

The Government’s declared aim, described in the Growth and Transformation Plan for 2010/11-2014/15 and in the Climate Resilient Green Economy (CRGE) Initiative, launched in 2011, is a huge expansion of the infrastructure in the energy sector. The main target is to increase the electricity generation from currently approx. 2,200 MW to the range of 10,000-12,000 MW between 2015 and 2017 and some 25,000 MW in 2030. Hydro shall contribute

approx. 21,000 MW, wind 2,000 MW, geothermal 1,000 MW, waste-to-power 500 MW and solar up to 500 MW to these 25,000 MW. The number of customers connected to the grid shall rise from the current level of 2 million to 4 million and the general access rate from 52% to 75%. The increase in the generation capacity will be largely (approx. 85%) based on the construction of new large hydropower plants with calculated generation cost estimates in the order of 6-7 USD cent/kWh – such estimates are regarded as too low by international experts and may well go up to 10 US¢/kWh if all related infrastructure and secondary costs are properly attributed.

The improvement of efficiency of the existing energy resources is another target. In the last years, the government tried to pave the way for more private investors to generate electricity and feed it into the grid. Proclamation 37/1997 opens domestic investors the possibility to invest in plant capacities of up to 25 MW. Only foreign organisations are permitted to invest in power stations with a capacity of over 25 MW. Council of Ministers Regulations No. 7/1996 and No. 36/1998 introduced additional tax relief and improved import regulations as incentives for private investment. Nonetheless, the electricity sector is still controlled by the state. Following are some of the major highlights from the policies and strategies of the country which are in the process of updating, making use of the findings of the Energy Sector Mapping and Database Development (ESMAD) Study, Phase 1.

The government realizes that the rural areas are not yet adequately included in the ambitious infrastructure expansion plan. It assumes that the rural energy usage will remain to be dependent on traditional fuel, especially for cooking purposes. Therefore, the government plans to scale up the dissemination to 9 million fuel-efficient stoves (FES) by 2015 and to 34 million FES by 2030. At the same time, off-grid solutions will be needed to electrify rural households not reachable by the national grid at least in the short to medium term.

The rural program is expected to reduce significantly CO2 emissions, to increase the rural household income by up to 10%, reduce deforestation and create an industry for the manufacturing of cook stoves.

1.2.2 Energy Legislation and Regulation

The most important energy legislation currently under preparation are (i) the Energy Proclamation which will replace the existing Electricity Proclamation – the final MoWE draft is currently under advanced discussion at Prime Minister's Office for Cabinet approval before being forwarded to Parliament for final enacting, (ii) the new Feed-in Tariff (FiT) Proclamation as incentive to attract independent investors / power producers – the Draft is still under discussion between MoWE and EEA (see 1.3) as the original drafting body and its submission to Cabinet is not yet scheduled, and (iii) the Energy Operations Regulation dealing especially with licensing, codes, tariffs and customer rights & obligations – the existing EEA draft will be further processed one the Energy Proclamation is enacted.

Current regulatory activities of EEA consist in particular of approving the EEPCo tariff system and proposals as well as licensing of EEPCo power installations and related commercial units, including those operated by others under BOT and similar management contracts with the owner EEPCo.

1.2.3 Linkages with CRGE and ICS Investment Plan (IP) and Program of Ethiopia

The Endev up-scaling proposal is in compliance with the Climate Resilient Green Economy (CRGE) Strategy of the Government of Ethiopia (CRGE Ethiopia, 2011). As one of the four initiatives for fast-tracking under the CRGE technologies, the ICS program is directly linked to this initiative and will set up the foundation for the CRGE goal to reduce emission by 54 mega-tons (Mt) of carbon dioxide equivalent (CO2e) in 2030 through the deployment of a combination of fuel-wood-efficient, LPG, biogas and electric stoves.

Ethiopia is also highly vulnerable to climate change. Ethiopia's Growth and Transformation Plan (GTP) 2011-2015 (MoFED, 2011) has set the goal of maintaining a double-digit eco-

nomic growth rate to elevate the country to middle-income status by 2025. The aim is to do so by pursuing a net-zero-GHG (green-house gas) emission growth strategy, while at the same time building the resilience of the economy to climate shocks. Further to the GTP, Ethiopia's CRGE Strategy outlines the vision, strategy, financing and institutional arrangements in pursuing to attain the triple goals of economic growth, net-zero-emissions and building climate resilience.

The Cookstove Investment Plan has been officially launched in 2011 and implementation commenced after preparation of the program document in 2012. The objective of the National ICS program is to support the dissemination of 9 million improved cookstoves in Ethiopia up to January 2018 through building sustainable and vibrant markets for improved cookstoves and institutional capacity (ICS program Ethiopia, 2013).

In January 2010, the Government of Ethiopia reaffirmed its commitment to the Copenhagen Accord by submitting a list of voluntary Nationally Appropriate Mitigation Actions (NAMAs) to be implemented by 2020. Under the category "Electricity Generation from Renewable Energy for Off-grid Use and Direct Use of Renewable Energy" (i.e. for cooking heat energy), a project to distribute 9,000,000 improved biomass household stoves starting from 2010 up to 2015 is mentioned. As stated in the ICS document, the ICS program has been integrated to various international initiatives including SE4All, Global Alliance for Clean Cookstoves (GACCs) and Women's Green Business Initiative (WGBI).

The ICS program is being implemented by MoWE, with the support of development partners including GIZ-ECO as indicated in the project document, plays a major role in energy policy and program implementation on the national, regional and Woreda levels. MoWE is the main political partner of GIZ-ECO and both have signed an Implementation Agreement in February 2013. GIZ-ECO will be a priority member of the Multi-stakeholder Platform (MSP) to be established by end of 2013.

As indicated in the National ICS document, the proposed program will not materialize without adequate financial resources. The ICS Investment Plan has been designed in such a way to provide the confidence required for potential donors and financiers to support the ICS program.

1.3 Institutional Set-up in the Energy Sector

At the Federal Government level, there exist a number of institutions involved in the energy sector of the country. The Ministry of Water and Energy (MoWE) is responsible for the overall development of the energy sector. MoWE has several directorates and agencies dealing with energy issues, in particular:

- The two Directorates of Alternative Energy Technology Development (AETD) and Alternative Energy Technology Promotion and Dissemination (AETPD), which have just been merged to the Alternative Energy Technology Development and Promotion (AETDP) Directorate – with the mandate to carry out national energy resource studies, data collection and analysis, rural energy policy formulation, technology research and development, and to promote appropriate renewable energy technologies in rural areas;
- Rural Electrification Fund (REF), administered by the AETDPD, with the Development Bank of Ethiopia functioning as the Trust Agent – to enable private and cooperative engagement in rural electrification activities through loan-based finance and technical support;
- Bio-Fuels Directorate – in charge of newly upcoming liquid bio-fuels such as biodiesel and ethanol, including related research, support to pilot production and promotion;
- Energy Studies and Development Follow-up Directorate (ESDFD) – among others in charge of energy database and policy development, information and planning, includ-

ing renewable and non-renewable energies, supervision of electricity and petroleum subsector operations;

- Ethiopian Electricity Agency (EEA) – to regulate the electricity generation, transmission, distribution, sale and export/import of electricity. The EEA controls quality standards in the electricity sector and licensing of electricity operators and contractors including tariff settings. In addition, the EEA also has an Energy Efficiency Department, dealing among others with solar-thermal applications, especially solar water heating. Once the Energy Proclamation is in place, the EEA will be renamed "Ethiopian Energy Agency" and be in charge of regulating the energy sector as a whole.

MoWE is working closely with two public enterprises: the Ethiopian Electric Power Corporation (EEPCo) for the electricity sub-sector, and the Ethiopian Petroleum Enterprise (EPE) for the petroleum sub-sector. EEPCo is mandated to generate, transmit, distribute, and sell electricity. The corporation disseminates electricity through two different power supply systems: the Interconnected System (ICS) and the Self-Contained System (SCS). The ICS (national grid), which is largely fed by hydropower plants, is the major source of electric power transmission and distribution. The SCS (isolated area and local grids) is mainly based on diesel generators and to a minor portion on small and medium hydropower plants.

At a regional level, energy activities are mainly supported by regional energy bureaus/agencies, which are part of regional governments, and by regional energy institutions, such as the Oromia Water, Mines & Energy Bureau and the Regional Rural Electrification Executive Secretariat Offices with support and advice from MoWE-AETDPD.

Up to recently, there were only few private companies active in the energy sector. The number of manufacturers, assemblers and dealers of renewable energy technologies in Ethiopia in all technology areas is now increasing significantly, with solar retailers as the fastest growing segment.

1.4 Major Donor Activities

World Bank: Electricity Access – Rural Expansion Phase II (2007-2011): The development objective of the Second Electricity Access Rural Expansion Project in Ethiopia is to establish a sustainable program for expanding access to electricity in rural communities, thus supporting broad-based economic development and helping alleviate poverty. The Project will significantly expand access to and services provided by electricity in rural towns and villages. A major component of the project is grid access expansion aiming at grid extension and increased customer connections.

The World Bank, acting as administrator for the Global Partnership on Output-Based Aid (GPOBA), has signed a grant agreement for USD 8 million with the Ethiopian Electric Power Corporation (EEPCo) to support increased access to electricity in rural towns and villages with grid access, within the context of the Universal Electricity Access Program (UEAP) in Ethiopia. Up to 228,571 low-income households will benefit from the scheme through a new or regularised electricity connection and the provision of two energy-efficient Compact Fluorescent Lamps (CFLs). The lamps will reduce their electricity consumption by 55 per cent and make their bills more affordable.

The World Bank also provides financial support to the Rural Electrification Fund and the Lighting Africa Programme in Ethiopia. Since recently, funding of off-grid electrification through renewable energies is facilitated by an agreement with the Development Bank of Ethiopia under the Ministry of Finance and Economic Development (MoFED). In addition, it participates in funding high-voltage interconnectors with neighbouring countries, geothermal investigations and regional initiatives such as the "Nile Basin Initiative" (NBI).

Energy Access Project (GEF) – The main objective of the project is to contribute to the reduction of greenhouse gas emissions as a portion of the diesel used for power generation would be displaced by renewable energy. The Energy Access Project will also provide affordable electricity to a large number of rural and small town dwellers on a sustainable basis,

and support income-generating activities made possible by the new power supply. In this context, USD 35 million are provided for EEPCo to facilitate customer credits for newly connected households. It targets villages and rural centres where local distribution grids are appropriate.

African Development Bank (AfDB): The scope of interventions is similar to World Bank though with a lower financial volume. The Rural Electrification Project II envisages grid connection of 335 rural towns and villages. AfDB is also involved in funding interconnectors and promotion of regional initiatives, especially the “Eastern Africa Power Pool” (EAPP).

European Investment Bank (EIB): The focus is on (co-) financing of large hydropower projects and improved power transmission, distribution and load management, including participation in cross-border power interconnectors.

European Union (EU): The EU is funding a wide range of interventions under several programmes and projects, including various renewable energy supply systems at regional and local levels, interconnectors and regional initiatives, in particular EAPP and NBI. In addition, large-scale global programmes such as the European Union Energy Facility (EU-EF), the European Union Energy Initiative (EU-EI, PDF Programme) and the EU/Africa Partnership in Infrastructure are also funding activities in Ethiopia. One example is the Household Energy Project led by HoAREC and with GIZ ECO and MoWE as 2 out of 10 partners, which is financed through EU-EF .

Climate Investment Fund – Scaling-Up Renewable Energy Program in Low Income Countries (SREP): The SREP Ethiopian Investment Plan supports the exploration of the Aluto Langano geothermal field and the installation of a wind power farm at Assela. In addition, it will provide USD 4 million for training, capacity building, and financing to SMEs in the period 2012-2015. All SMEs are eligible that sell: (i) energy access devices (improved cook stoves, lighting devices, solar home systems); (ii) efficient energy conversion systems for institutions (institutional cook stoves, solar water heaters, rooftop solar systems); or (iii) modern fuels (biomass briquettes, sustainably-produced charcoal). Specifically, SREP will build capacity and provide commercial financing that allow companies to develop new, professionalize existing and, ultimately, expand businesses that provide high-quality modern energy services in Ethiopia. The Project will be divided in two phases: Phase I: Capacity building of market players: The project will focus on removing barriers to the development of a strong supplier base for energy products that help to meet the Government's energy access and GHG emissions priorities; Phase II: Financing of Market Players (SMEs): The project will help to increase access to financing for market players by providing both capital for establishing new and expanding existing manufacturing facilities, and working capital.

Austrian Development Agency (ADA): In the current development programme phase, energy has been set as a priority, focusing on rural electrification by grid extension and decentralised solar PV systems.

France (AFD): The current focus is on the Ashegoda Wind Park Project in Tigray with an installed capacity of 120 MW and an annual energy production of 400-450 GWh. In May 2009 Ethiopia has signed a financing agreement with France amounting to EUR 210 million. Ashegoda Phase 1 (30 MW) is completed and Phase 2 (90 MW) under construction. The French Development Agency (AFD) intends to expand its activities, considering co-financing the interconnector from Ethiopia to Kenya as well as engaging in geothermal projects.

Great Britain (DFID): The main interest of DFID is to initiate climate funding projects (including the energy sector). DFID is playing an important role in the newly established Climate Partners Group. Although related investment programmes are under preparation in cooperation with the Ethiopian Government, so far no specific projects are in the planning or implementation pipeline. DFID also supports the establishment of a Climate Innovation Centre (CIC) intended to develop and promote suitable technology applications.

DFID has joined the EnDev Programme under a climate funding oriented perspective in 2012 with the intention to jointly test a result-based financing (RBF) approach in the context of rural energy access. Joint activities over 4 years for the commercial dissemination of improved cook stoves in selected Woredas of Oromia and Tigray are in the initial stage of implementation.

Italy: Main activities consist of planning, financing and construction of large hydropower plants, such as HPPs Gilgel Gilbe II and III.

Netherlands (DGIS): As with the co-financing of EnDev, DGIS generally focuses on renewable energy promotion programmes.

SNV implements a National Biogas Programme in partnership with the MoWE-AETPDD. Implementation started in May 2008 with the construction of 100 demonstration biogas plants in 4 regions (Tigray, Oromia, SNNPR and Amhara). In an initial phase (2008-2013), constructing a total of 14,000 biogas plants is targeted. The biogas programme in Ethiopia is part of the comprehensive biogas programme for Africa launched at the end of 2007.

DGIS temporarily finances the Horn of Africa Regional Environmental Centre (HoA-REC) based at Addis Ababa University. In the energy sector, HoA-REC is involved in renewable household energy projects and in stimulating carbon financing in some of its own developed energy projects, originally as part of a small platform pushing on carbon/CDM problem solving. Other partners of the platform are MoWE, UNDP, EPA and GIZ. In 2011, the Platform has been enlarged and upgraded to become the Climate Partners Group.

Norway: The former focus on planning larger hydropower projects and supporting the East African Power Pool (EAPP) was enlarged in 2011. Ethiopia has become a pilot country in the Energy+ Initiative. Norway also joined EnDev and is supporting a two-year RBF pilot phase in Ethiopia (2012-2013).

Irish Aid: So far, Irish Aid has not been involved in the energy sector under a focal programme. Key areas of the Irish Development Cooperation are health, agriculture and good governance. Cooperation with EnDev (so far limited to Ethiopia only) has started in 2012 for the provision of health centres with solar energy. It is now intended to also extend this cooperation to the ICS sector, along with tree plantation and briquetting activities, in order to address both the supply side as well as the demand side of fuel wood usage for cooking.

Coordination of Activities

There is also a close cooperation and coordination of the international and bilateral cooperation organisations in the Energy Sector Partners Group which is active since almost 4 years and has monthly meetings.

2. Planned Outcome

Energy Service Segment	Old Target	New Target
Energy for Lighting & Electric HH Appliances	35,000 people	130,000 people
Cooking Energy for Households	895,000 people	925,000 people
Electricity and/or Cooking Energy for social infrastructure	450 institutions	800 institutions
Energy for productive use/ income generation	1,000 enterprises	2,700 enterprises

3. Project Approach

3.1 Energy Technologies and Services Promoted by the EnDev Programme

EnDev-Ethiopia currently improves access to energy for households with a focus on rural poor to three types of modern energy services: a) mini-grid electricity based on micro hydropower, b) electricity for individual households based on photovoltaic devices/systems and c) energy-efficient and clean cook stoves.

In addition, EnDev is providing electricity generated by mini-hydropower or photovoltaic systems to social institutions and small enterprises as well as energy-efficient cook stoves to social institutions and small enterprises.

With this approach EnDev supports the Ethiopian Government's plan on extension of renewable energy infrastructure as defined in the Climate Resilient Green Economy Initiative and the Growth and Transformation Plan.

3.2 Approach to Provide Electricity to Households

3.2.1 Photovoltaic Systems

EnDev is promoting household electrification based on solar lamps/lanterns, batteries, solar kiosks and pico PV systems.

Many Ethiopian households use batteries (non-rechargeable batteries and/or car batteries) as energy source for lighting, radio and TV. EnDev has started encouraging the establishment of PV-based battery charging stations mainly in villages where social institutions are already electrified with a PV system. The battery charging stations sell high quality batteries (preferably solar batteries), provide battery services and charge batteries and mobile phones for consumers. The charging station are owned and operated by the community or as a private business.

In some villages, solar kiosks are being established offering not only battery and mobile phone charging services, but also other services like charging and lending lanterns and pico PV systems to households.

In addition, the project started to support the development of a Pico PV (low cost solar lighting systems) market in Ethiopia. Special focus is laid on the introduction and dissemination of solar LED lamps and lanterns. For this purpose the project supports a) well established local solar companies to commercialize pico PV systems especially in rural areas and b) entrepreneurs and start-ups intending to establish a small pico PV business. The component is implemented in cooperation with the Lighting Africa programme of the World Bank and IFC.

For all solar activities which include the use of solar batteries, the replacement and recycling of the batteries is being discussed with a local battery factory.

Main activities in the field of solar energy will include:

- Technical and business training of solar companies, entrepreneurs and start-up enterprises/vendors in providing reliable, affordable lanterns/lamps and pico PV systems;
- Facilitation of promotion of high-quality products with guaranteed lifespan;
- Facilitation of the development of distribution chains or sales outlets in rural areas;
- Awareness raising for electric lighting;
- Training and support to the establishment of solar kiosks;
- Support to owners and operators in managing solar kiosks and battery charging stations;
- Support to owners and operators in setting up a tariff system;
- Facilitation of business-to-business contacts;
- Support to the establishment of a warrantee system for solar products;

- Establishment of up to 3 solar training & info centres attached to host institutions.

3.2.2 Mini Hydro Power

The main approach in the field of MHP is consolidation, especially continued advice to the community-owned cooperatives operating the existing MHP pilot stations and village grids in Sidama Zone and support in mobilising additional customers.

In addition, EnDev has identified several new sites suitable for small hydro power supply as well as water mill upgrading to power generation for village electricity supply. Upgrading of watermills will be piloted under EnDev directly, whilst development of new hydro power sites would only be realised in cooperation with other organisations providing (co-)finance budget.

To utilize this potential,

EnDev will engage in:

- Implementation of detailed feasibility and socio-economic studies about the sites;
- Selection of the most promising sites together with partner organisations;
- Detailed design of the construction and installation of the power plant and the village grid;
- Development of a financing scheme for the construction and installation that includes financing from different sides, focusing on facilitation of investment capital mobilisation for the construction of 2 hydropower plants or upgrading of 2 watermills to village supply;
- Continued training of and advice to project developers and turbine producers;
- Training of involved municipalities, local communities, millers and other operators in the management, operation, maintenance and repair of the MHP plant and the village grid;
- Support to the communities and operators in developing a sustainable tariff system;
- Support to the monitoring of the construction/installation work as well as the operation of the power plants and village grids;
- Establishment of up to 2 MHP training & info centres

3.3 Approach to Provide Clean Cooking Technologies to Households

EnDev has been promoting energy-efficient and clean cook stoves in Ethiopia since 2005. The stoves promoted are: the “Mirt” injera baking stove, the “Addis” injera baking stove, and the household rocket stove (“Tikikil”). Up to 2012, interventions focused on the five regions of Amhara, Oromia, Tigray, SNNPR (Southern Nations, Nationalities and Peoples Region) and Addis Ababa but recently Diredawa and Harar have been added at a still low level. It is also planned to extend the activities in the coming years to more remote regions, being Benishangul-Gumuz, Somali and Afar.

EnDev cooperates closely with the Ministry of Water and Energy (leader and owner of the National Stove Programme) and several other partners among them:

(a) other ministries and government offices (Ministry of Agriculture, Regional Bureaus of Agriculture, Environmental Protection Authority (EPA), Regional Energy Bureaus, Ethiopian Standard Agency (ESA), regional Bureaus of Trade and Industry, regional Women’s Affairs Bureaus, etc.;

(b) Donors, International Organisations, International NGOs (UNHCR, the World Bank, the Energy Sector and Climate Partners Groups and all other institutions involved in the CRGE investment plan, the World Food Programme, World Vision, ZOA etc.);

(c) National and local NGOs, private sector actors (the Ethiopian Conformity Assessment Enterprise (ECAE), regional Women’s Associations etc..

In the context of this up-scaling approach, main activities will be:

- Extension of the project activities from 7 to at least 9 regions, including training of trainers;
- Enhancement of biomass-based fuel supply (such as marketing of briquettes as well as tree planting and marketing by different parts of the community and private sector).

Continued activities, increasingly involving partners, are:

- Awareness raising and consumer information on cooking technologies, particularly preparation of different promotional tools/materials on the benefits of the improved stoves such as leaflets, posters, banners, radio and TV clips;
- Technical and business training of stove producers and start-up enterprises in close collaboration with experts of the Ministry of Water and Energy;
- Training of trainers in the field of cook stove manufacturing;
- Assistance for business start-ups;
- Marketing support for stove producers and vendors;
- Promotion of the stove producers' network;
- Dissemination of moulds to Mirt producers, plus information & re-training and introduction & promotion of extruders to increase production of stoves;
- Enhancement of a quality check system, including regular testing of the quality of produced stoves, certification of products and development of a brand for checked quality;
- Further independent testing (and subject to confirmation of initial positive test results) possibly also promotion of innovative stove models such as Gonziye and Awramba;
- Support of fast market penetration by facilitation of financial incentives (producer subsidies of up to 20% of stove price) for initial stove dissemination in order to stimulate regional stove market development in new areas as result based financing approach (RBF).

3.4 Approach to Provide Access to Modern Energy Services for Social Institutions

With a clear focus on up-scaling, social institutions receive access to electricity and to energy-efficient clean cook stoves. The focus of the electrification activities will be on providing solar systems to health centres. In addition, a small number of social institutions will get connected to mini-grids of newly installed hydro power plants. The focus in the field of cook stoves will be all-day and boarding schools, universities and others.

3.4.1 Photovoltaic Systems Including Solar Water Pumps

PV Systems for Health Centres will be implemented in the SNNP and Tigray Regional States, preferably in regions where some health centres have already been equipped with PV systems. PV systems for community centres and schools will mainly be implemented in the eastern regions, again preferably in communities with PV electrified health centres.

Partners for the PV interventions will be the Ministry of Water and Energy (MoWE), the Ministry of Health (FMoH) and the Ministry of Education (MoEd) through their national, regional and local structures. Close cooperation is planned to continue with universities (in particular the universities of Adama, Mekelle, Bahir Dar, Gondar, Awassa, Arba Minch, Addis Ababa and Jimma) and vocational training centres (SELAM and others). Furthermore the Project will work with additional players in the solar sector in Ethiopia, such as the Solar Energy Development Association of Ethiopia (SEDA-E) as well as several institutes of the finance sector.

Major activities are as follows (largely continued, increasingly involving partners):

- Ensuring specification, design and procurement of high-quality PV power supply systems;

- Supervision of installation and commissioning of PV systems at identified health centres;
- Supervision of installation of solar pumps for 8 and solar water heaters for 6 health centres;
- Supervision of the after-sales service;
- Conduction of further installation and commissioning training;
- Quality control;
- Conduction of a need assessment for a maintenance and repair system for health centres and pump stations;
- Implementation of an appropriate maintenance and repair system;
- Training of operators and stakeholders;
- Support of solar companies in set-up, maintenance and repair services in major regions;
- Training of operators of the solar systems (staff of the social institutions) to guarantee a sustainable use of the installed plants;
- Identification of level of stock for HC PV power supply and water pumping systems;
- Identification and securing of a location for stock;
- Organisation of stock management;
- Supervision and integration of the system;
- Connection of social institutions to hydropower-driven mini-grids
- Monitoring of sustainability of energy services provided under the EnDev Programme to social institutions.

3.4.2 Energy-efficient Cook Stoves for Social Institutions

EnDev/ECO has developed an Institutional Rocket Stove (IRS) based on the proven technology principles of the Aprovecho Research Center. Marketing and promotion are gradually on the way since the start of EnDev 2. Complementary to the cooking on the rocket stove, a modification of the Mirt stove has been developed for the baking of Injera in institutions by adding a chimney and reinforcing it with mud.

Main target group of the activities will be schools. In addition, joint activities with the World Food Program about the possibilities to promote IRS in WFP-supported schools are under preparation. Tertiary educational institutions, prisons and health centres (as far as providing meals) are also targeted.

Activities in the field of institutional stoves are identical or similar to the ones for households. Especially the following will be continued, increasingly involving partners:

- Awareness raising on cooking technologies among social institutions;
- Training of institutional cook stove producers;
- Support of cook stove producers in marketing activities;
- Facilitation of financial incentives for institutional cook stoves;
- Enhancement of a quality check system for stoves for social institutions;
- Monitoring of sustainability of energy services to social institutions.

3.5 Approach to Provide Access to Modern Energy Services to SMEs

It is planned to provide 150 SMEs with electricity as well as 2,550 SMEs with improved cooking technologies as part of general electrification and cook stove activities. Especially in the case of hydropower- based mini-grids, it is important that the consumption of higher amounts of electricity is combined with commercial activities so that additional income will be generated. However, also small systems can have a positive economic effect. Solar lanterns may help shopkeepers to extend their sales hours and make the shop safer. Improved cook stoves reduce costs of restaurants and canteens.

In the context of an up-scaling approach, main activities continued in this component will be:

- Training of solar companies in providing reliable, affordable PV systems for enterprises;
- Training of solar entrepreneurs/vendors;
- Facilitation of financial incentives for promotion of high quality products with guaranteed lifespan;
- Support of solar companies in set-up, maintenance and repair services in major regions;
- Connection of small and medium-sized enterprises to hydropower-driven mini-grids;
- Awareness raising on cooking technologies for enterprises;
- Training of producers of cook stoves suitable for productive purposes;
- Marketing support for stove producers and vendors;
- Training of SMEs for productive use of electricity.

3.6 Policy, Strategy and Communications

In the last four years the Ministry in charge of Energy with its different national and regional departments as well as REA often involved EnDev/ECO in discussions and advice on different topics of Ethiopia's energy policy. This also offered an opportunity to share and discuss the results and experiences gained from the project implementation. In fact EnDev has been asked to support and, together with MoWE, supervise the Energy Sector Mapping and Database Development (ESMAD) Study and to comment on the formulation of the Energy and Feed-in Tariff Proclamations.

The participation in discussion on the formulation of policies, strategies, master plans, programmes, laws and regulations has gained increasing importance due to the efforts of the government to harmonize different donor contributions within the context of the Energy+ and Sustainable Energy for All initiatives. Both initiatives underline the crucial role of the private sector and Public Private Partnerships. EnDev/ECO already established close relations to international and national enterprises and intends to enhance their investments in the energy sector. ECO will also continue its active involvement in the coordination of sector partners as member of the Energy Sector Partners Group and the Climate Partners Group, in close liaison with international organisations, such as World Bank, African Development Bank, EU, as well as bilateral development partners, including the Embassies of the Netherlands, Norway and Germany.

EnDev/ECO has started working on scaling up and enhancing the production and commercial capacities of producers and retailers of electric appliances and cook stoves, in order to improve the sustainability of the activities. It trains SMEs not only in technical but also business skills. Successive monitoring and technical follow up is being underway to ensure a high quality of products and services. Moreover, EnDev/ECO will continue to promote networking of the producers and retailers with different potential institutions.

EnDev/ECO will promote information sharing & awareness creation and advice on options for improved access to modern energy services among program partners, stakeholders, and the general public. In addition, EnDev/ECO will support capacity development in partner institutions related to promotion of improved access to modern energy services.

Main activities will be:

- Support to the review/formulation of and alignment with policies, strategies, master plans, programmes, laws and regulations in close coordination with Energy+ and SE4A stakeholders, including the Ethiopian Government's new ICS and BEST strategies;
- Support to Phase II of the Energy Sector Mapping and Database Development Study;
- Assistance to establishment of Public-Private Partnerships in Renewable Energy Development.

The following activities will be continued:

- Promotion of information sharing and awareness creation as well as advice on options for improved access to modern energy services among program partners, stakeholders and the general public, focusing on the promotion of RET;
- Support of capacity development in partner institutions related to promotion of improved access to modern energy services;
- Support to the Ministry of Health and the Ministry of Education in integrating energy supply in the design of new health centres and schools;
- Support to partners & stakeholders in identification of interventions for improved access to modern energy services and funding opportunities;
- Support to the promotion of renewable energy activities/programs relevant for private sector development;
- Support to improvement of the capacity of relevant institutions, NGOs & universities to ensure development of RE enterprises;
- Joint data gathering and evaluation with partner organisations and representatives of regional governments.

4. Expected Impacts of the Project Intervention

Impact	Possible Indicators
Environment	• Reduced use of kerosene and dry cells batteries
Health	• Reduced emissions from burning of liquid fuels • Improved maternal health • Improved medical service for the poor
Poverty/Livelihood	• Improved living conditions • Increased income • Increased number and diversification of businesses
Education	• Improved access to ICT and information for HC staff • Increased number of qualified service providers, i.e. crafts people, technicians, etc. • Improved level of education
Governance	• Improved investment climate for energy production and delivery • Improved capacity/service delivery (processing times)
Climate Change	• Reduced or avoided emissions • Access to climate finance

EnDev Ethiopia will specifically focus impact monitoring and evaluation on the reduction of indoor air pollution, on improved services of electrified health centres and on the reduction of greenhouse gas emissions. The following impacts are expected:

- The health situation of at least 900,000 persons among them 500,000 women and children has been improved due to reduced indoor-air pollution till 2015 (source: interviews of households, measurements of indoor air pollution).
- At least 50% of the clients of recently electrified health centres confirm that the quality of the service has improved as a result (source: interviews with clients).
- Green House Gas emissions as a result of EnDev 2 activities will be reduced at least by 50,000 tons CO2 per year (source: calculation of the reduction of greenhouse gas emissions based on the savings of fuel wood through energy efficient stoves and the replacement of kerosene lamps with electric lamps).

5. Possible Risks and Potential Ways to Mitigate Them

Certain risks with regard to the general development within the Ethiopian political and energy sector environment might affect the project.

a) Resulting from the 2012 initiative of the International Year of Energy Access for All the risk might occur that other institutions start providing support based on subsidies, which could disturb the fragile development of private markets, supported under EnDev.

   This risk can be addressed through active participation in donor meetings and by providing advice to the national government.

   Similarly massive Chinese infrastructure investments in Ethiopia might influence the market development. In this case it might be more difficult for the project to intervene.

b) The highly dynamic infrastructural development going on in Ethiopia might lead to a faster electrification rate in large cities compared to what is currently foreseen. If this materialises, households and especially productive use enterprises might start purchasing electric stoves. Electric Mirt stoves are already available in urban markets at large scale at the costs of around 10 times more than those for the ICS distributed by EnDev. However, those entrepreneurs who start being in the position to save money might soon be able to invest in this field. EnDev might react on this risk by moving out of urban markets and entering new remote areas for stove activities.

c) Similarly, the National Electricity Grid might eventually reach the sites where EnDev has built off-grid hydropower plants, causing a risk for their sustainable operation. This risk is addressed by providing advice at government level to introduce a reasonable feed-in tariff legislation and operations regulation.

d) Finally, the risk of occurring bureaucratic obstacles remains, due to high fluctuation within the Ethiopian government agencies. This might specifically lead to complications with regard to tax and import regulations, since agreements made with specific persons are not necessarily also considered as valid with their respective successors.

The project has started to assess possibilities to alternatively sign agreements with agencies at regional government level where the level of cooperation is more intense and stable to overcome the bureaucratic hurdles.

6. Budget

Old: EUR 12,687,000 (incl. variable budget, Irish Aid budget and DFID budget).

New: EUR 15,487,000,

Total up-scaling of € 2,800,000 (€ 1,800,000 EnDev Global Basket + € 1,000,000 Irish Aid);

		EUR
1	Human resources and travelling	1,403,998
2	Equipment and supplies	625,396
3	Funding financing agreements / local subsidies	3,067
4	Other direct costs	240,990
5	Total direct costs (sub-total)	2,273,451
6	Mark-up costs / administrative overheads/imputed profit	526,549
7	Cost price	2,800,000

Indonesia

Promoted technology	Solar Home Systems / PV mini grids/MHP		
Project period	Old: 05.2009 – 6.2014 New: 05.2009 – 7.2018	**Project budget:**	Old: EUR 9,000,000 New: EUR 11,960,000
Target Groups	Unelectrified villages across Indonesia Renewable energy public and private sector in Indonesia		
Lead Political Partner	Directorate General for New and Renewable Energies and Energy Conservation (DGNREEC) under Ministry of Energy and Mineral Resources		
Implementing organisation	GIZ		
Implementing partner	Directorate General for New and Renewable Energies and Energy Conservation (DGNREEC)		
Involved bilateral / multilateral programmes	Through and with DGNREEC cooperation with other rural electrification programmes will be sought/established		
Summary of Key Interventions and Outputs	- Create synergism between different rural electrification programmes and actors in support of counterpart (towards efficient coordination mechanism, consolidated electrification programme and plan on national/regional level, unified best practices) - Strengthen national rural electrification programmes under counterpart DGNREEC and other government ministries (technical quality assurance, community preparation, monitoring and evaluation and productive-use of energy support) - Pursue opportunities under the national utility PLN for grid expansion - Pursue private sector strengthening in rural electrification (capacitate service providers, establish incentive schemes) - Continue performance monitoring, evaluation and optimisation initiatives of rural off-grid infrastructure and transfer best practices to counterpart organisation		
Target (number of beneficiaries)	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	112,000	172,000	people
Cooking energy for households	0	0	people
Electricity and/or cooking energy for social infrastructure	200	900	institutions
Energy for productive use/ income generation	340	1000	SMEs
Project Manager	Name: Rudolf Rauch, email: rudolf.rauch@giz.de		

1. Situation Analysis

1.1 Energy Situation

Indonesia has shown impressive economic growth over the past decade. This came along with an even faster increase in electricity consumption, which has reached 7% per annum in

recent years. However, this growth took mainly place in the densely populated areas on Java and some other economic centres, leaving out remoter islands and rural areas. Presently 32 GW of electrical capacity are installed in Indonesia, out of which 80% are installed in the Java-Bali grid. The remaining 20% are dispersed over 6,000 inhabited islands spanning 6,000 kilometres east to west, leaving many rural areas in the dark.

The National electricity supply is dominated by fossil fuels, with Renewable Energy comprising only 5% of generation, compared to natural gas (24%), coal (24%) and oil (47%). Government has developed a Vision25/25, which seeks to ensure an equal share of about 25% between the four energy carriers. Current national electricity generation capacity is reaching its limits as annual electricity demand grows by 8.5% and at least 81% of power plants will still operate on fossil fuels by 2020, according to the national utility PLN (PLN operates more than 5,000 power plants with an average capacity of 5 MW). Average generation cost of electricity is EUR 0.09/kWh (but diesel-based electricity generation costs outside the Java/Bali grid ranges between EUR 0.2/kWh to EUR 0.6/kWh), while the average selling price is around EUR 0.055/kWh. PLN also aims to reduce oil consumption from 21% (2011) to 3% by 2015, but this seems overly ambitious. An active strategy towards engaging the private sector as Independent Power Producers (IPP) was launched in 2012. Currently feed-in tariffs for solar PV, hydro and biomass energy are available, but institutional frameworks still provide stumbling blocks for IPPs. There is a surge of interest in renewable energy in Indonesia and a vibrant sector is establishing itself, and Government has established a dedicated Directorate General for New and Renewable Energies and Energy Conservation (DGNREEC) in 2011, under the Ministry of Energy and Mineral Resources, to address the challenges ahead. While there is much dynamism and stakeholder involvement in the national grid debate, rural electrification remains comparatively marginalised and characterised by ad hoc uncoordinated interventions by several public and private entities.

Indonesia has a relatively low overall rate of electrification for a middle-income country. Figures and interpretations diverge, but as much as 30-35% of the population do not have access to electricity. This implies about 75 million people across Indonesia. For them, the prevalent energy sources such as diesel gensets, batteries, or kerosene are costly, and require a high share of the household income. This is compounded by government's much debated approval of up to 30% price increase in diesel and petrol in June 2013, with a clear indication that subsequent price increases will follow. Apart from the increasing costs, insufficient energy supply also hampers the development of small businesses and social infrastructure in rural areas. The Indonesian Government has a target of achieving over 90% electrification rate by 2020, but the rate of grid-based electrification is slowing (electrification ratio in 2011: 72.95%; in 2012: 76.56%; target in 2013: 79.3%; target in 2014: 81.4%) due to increased transmission costs. DGNREEC has responded with an ambitious off-grid electrification programme in 2012. During the budget year 2012/13 alone, about EUR 32 million was allocated towards rural electrification infrastructure. Already by mid-2013 DGNREEC commissioned 117 15kWp solar mini-grids (PV-VP - photovoltaic village power) in rural areas at a total budget of EUR 23 million. Data taken from General Plan of DGNREEC Procurement 2013 (dated 14 December 2012) shows that over EUR 110,000 is allocated towards feasibility studies for MHP and solar sites, over EUR 7 million for the construction of MHPs in 19 provinces and over EUR 19 million for PV-VP systems in 32 provinces.

1.2 Policy Framework, Laws and Regulations

Several laws and regulations touch on rural electrification with a strong trend to incorporate more renewable energy resources. The current National Energy Plan sets ambitious targets for rural electrification: 90% of all households and 100% of all villages by 2020.

The Decree on Renewable Energy Resources and Conservation (MEMR 2/2004) pursues such objectives as optimising and improving the efficiency of renewable energy resources, securing sustainable, environmentally compatible forms of power generation, increasing public awareness and improving consumer behaviour with regard to energy conservation.

The Presidential Regulation 5/2006 determines that renewable energies share of total energy supply should be increased to 17% by 2020. This regulation was subsequently strengthened by Vision 25/25 (18% renewable and 7% other new energies by 2025) as a political statement.

A number of MEMR Regulations (1/2006; 1/2007; 5/2009; 17/2013) refer to grid-connected renewable energies and feed-in-tariffs covering technologies from biomass, solar PV, municipal waste and hydro. Some regulations are entrenched through Presidential Regulations and regulations from BAPPENAS (National Planning Bureau), particularly regarding public private partnerships in infrastructure provision (3/2012). Within this hub of activity, there are still a number of teething issues, specifically regarding institutional frameworks, but they receive attention and should be resolved over time, particularly as there is a clear political will towards enhanced deployment of renewable energies in Indonesia.

The Coordinating Ministry of People's Welfare is responsible for the development and administration of poverty reduction policies and programmes. In the last years government programmes have been consolidated in 3 major clusters focussing on a) individual assistance and social protection (subsidised staple food and scholarships for the poorest), b) national programme for community empowerment (PNPM) and c) strengthening of small and medium enterprises (mainly by providing cheap credits). As a core element of the national poverty reduction strategy PNPM has been up-scaled in 2009 covering the whole country with a budget over USD 2 billion. The PNPM follows the philosophy of community driven development (CDD), providing institutional training and support to communities, who then can apply for funding for self-defined community development projects. The core PNPM cycle is foreseen to be implemented for three consecutive years building the institutional base in the villages for later intervention of other sector programmes. As communities are free to define their priorities they can also opt for local energy infrastructure projects like hydro powered mini grids. Green PNPM, which was substantially supported by EnDev2, was a pilot subcomponent under Rural PNPM (implemented by Ministry of Home Affairs - MoHA) with the explicit purpose of promoting environmentally-friendly rural electrification technologies, like MHPs. Green PNPM concluded in December 2012.

1.3 Institutional Set-up in the Energy Sector

The Ministry of Energy and Mineral Resources (MEMR) is responsible for the national energy policy and is supervising state-owned utilities and energy service companies. Important aspects of implementation have been transferred to the provincial and district level in the course of the ongoing decentralisation process.

The GoI rural electrification programme is coordinated by MEMR, with two objectives: a) to provide electricity to un-electrified villages by extending the grid and b) installing RE based electricity systems (off grid). The first objective is implemented by PLN (using National Budget and Local Budget), while DGNREEC (under MEMR) pursues the second objective. Coordination should be done by the Sub-directorate of Rural Electrification under the Directorate General of Electricity (DGE), the sub-directorate however does not appear to be a technology implementing agency. DGE is primarily responsible for electricity sector policy and its regulation. Thus, as the central governmental institution for renewable energies and rural electrification with dedicated budgets for technology deployment and infrastructure development, DGNREEC is the central counterpart for EnDev Indonesia.

Under DGNREEC, EnDev2 reports to and coordinates with the Head of Cooperation, being responsible for ensuring that "external" interventions complement the DGNREEC programmes.

The Ministry of Finance has taken over a leading role in responding to climate change issues. MoF leads an inter-ministerial working group on climate change and low carbon issues.

BAPPENAS (National Development Planning Agency) prioritizes renewable energy projects, special rural electrification projects, determines level of government support, and appoints Government partners for ODA projects. BAPPENAS is the agency responsible for coordinating long- and medium-term (five-year) national development plans as submitted by various line ministries.

The National Energy Council (DEN) is chaired by the President, with the objective to define procedures to elaborate a National Energy Master Plan and Regional Energy Master Plans and to clarify the authorities of the central and local governments.

The Directorate General for Community and Village Empowerment (PMD) within the Ministry for Home Affairs (MOHA) implements the Rural PNPM and was supporting the Green PNPM pilot programme (concluded in December 2012). The objective of Green PNPM was to provide additional funding to the existing block grants provided under Rural PNPM for activities contributing to the sustainable management of natural resources (NRM). The Green PNPM was jointly financed by Australia, Canada, Denmark, and the Netherlands.

Ministry of Public Works (MPW) is responsible for hydro power resource surveys. In a few cases, the operation of hydro plants and building codes.

Ministry of Cooperatives and Small Enterprise Development (MOC) is responsible for enhancing the role of cooperatives in rural electrification and in some cases initiator of electrification projects.

The national electricity system is managed by the state owned utility company PLN which holds a monopoly for the power generation, transmission, and distribution, as well as power retailing. PLN runs a PV pico system programme (SEHEN – Super Energy saving Programme) in several regions in Indonesia. Under SEHEN, local companies supply PV pico systems through a PLN tender, and act as local vendors. PLN "leases" [17] the pico systems to households against a deposit payment and a monthly fee (for payment deposits a MoU between PLN and a commercial bank was signed). Furthermore, PLN is spearheading the 1,000 Island initiative, through which small Indonesian islands should be electrified using renewable energy or hybrid technologies. In most cases electricity supply exists, but is fossil fuel-based. The main objective of the 1,000 island initiative is to reduce operational costs and undertake grid expansion. Negotiations with World Bank and Kreditanstalt für Wiederaufbau (KfW) are currently underway for credit financing a pilot phase of up to 100 locations, through which about 20,000 households will be connected to the national grid.

NGOs play an important role in Indonesia's energy sector, but often also under different auspices such as environmental protection, poverty alleviation, health and sanitation or education. They are advisers, project developers, funding facilitators and managers of energy projects. EnDev2 has collaborated closely with a number of NGOs on pilot projects, but also as service providers.

1.4 Major Donor Activities

Energising Development has supported rural electrification programmes in Indonesia since 2006 (EnDev1: 2006 to 2009; EnDev2: 2009 - 2014) for the purpose of increasing access to modern energy to unelectrified communities. EnDev Indonesia has established a sound track record in sustainable MHP development, but has recently expanded its technology scope to include solar PV mini-grids. EnDev has produced substantial information materials, studies and guidelines, and maintains a comprehensive database of MHP and solar sites supported.

The World Bank has been supporting clean energy and clean development in Indonesia since the mid-1990s. One of the first WB-executed RE projects was the Indonesia Solar Home Program with the aim to provide PV systems for 200,000 Indonesian homes. However,

17 Source: *Report - Studies on SHS and 'SEHEN' in Sumba Island*, Hivos, Indonesia 2013

the project is generally regarded a failure due to the multitude of defunct systems. In 2005 WB published a study “Electricity for All: Options for Increasing Access in Indonesia”. Implementation was however delayed because of lending issues to local governments. More recently WB acted as coordinator of the PNPM Support Facility (PSF) for the Green PNPM pilot programme from 2009 to 2012. The PSF oversaw the transparent utilisation of funds and reported to a multi-stakeholder board. EnDev Indonesia in turn supported PSF in the technical implementation of the MHP schemes under Green PNPM. Finally, the WB had also commissioned a number of studies (Indonesia: Regional Electrification Master Plan Studies, 2009; Micro Hydro Power (MHP) Return of Investment and Cost Effectiveness Analysis, 2012) aimed at supporting decision-making in rural electrification.

The Netherlands, Denmark, Australia, UK and Canada supported Green PNPM. Green PNPM was a five years (2008 – 2012) Euro 41 million environmental pilot-project under Rural PNPM (National Program for Community Empowerment in Rural Areas). The pilot-project disbursed block grants and provided, through EnDev2, technical assistance to beneficiaries within target locations in eight provinces on the islands of Sulawesi and Sumatra for community investments in ‘green sub-projects’ – activities focused on natural resource management (NRM), environmental conservation, and renewable energy (RE).

The Asian Development Bank (ADB) is active in a range of projects from upstream gas field development to off-grid rural electrification using renewable energy. A project initiated in 2002 provided over USD 150 million in lending for connecting about 76,000 new customers to the power grid, including providing 10,000 low-income families in Indonesia’s outer islands with solar home systems and hydro based mini-grids. Loan 1982-INO is closing on 30 September 2013 and comprised 75.5 MW based on renewable energy (Geothermal of 45 MW, large hydropower of 20 MW and the rest mini-hydro power). No solar home systems were installed under the programme. The MHP systems included West Kalimantan (Merasap: 1.5 MW), Gorontalo (Mongago: 1.2 MW), North Sulawesi (Lobong: 1.6 MW), Lombok (Santong: 1 MW), Flores (Ende, Ndungga: 2 MW), and West Papua (Prafi: 2.5 MW) and were all grid-connected. Furthermore ADB is supporting the Sumba Iconic Island Initiative (100% renewables) through a study commissioned in 2013 to develop an energy master plan for the island. Results of the study are due for presentation to stakeholders by end 2013.

The Netherlands financed among others the “Casindo” programme supporting regional stakeholder forums to plan energy investment and local universities and vocational school in the field of renewable energies. Meanwhile the Netherlands phased out from energy sector.

Denmark is supporting in addition to the Green PNPM an energy efficiency programme in partnership with DGNREEC.

NGOs are proficient in leveraging funds from various sources, including international donor agencies and national corporate social responsibility (CSR) funds.

2. Planned Outcome

Energy Service Segment	Old target	New Target
Energy for Lighting & Electric HH Appliances	112,000 people	172,000 people
Cooking Energy for Households	0 people	0 people
Electricity and/or Cooking Energy for social infrastructure	200 institutions	900 institutions
Energy for productive use/ income generation	340 enterprises	1000 enterprises

The table below provides an overview of the electrification targets (using renewable energy technologies) by DGNREEC for the budget years 2013/14 and 2014/15 (no budget information is available for budget years beyond, since budgets are annually reviewed). This serves to illustrate the commitment to renewable energy and off-grid electrification. While DGNREEC has allocated the budget for achieving the targets, it is mostly likely that a specific target will not be reached in the set budget year (for instance due to failed tender processes, in which event the tender is re-launched and the budget transferred). For this reason we assume only reaching 50% of target beneficiaries per year. Based on this assumption, EnDev Indonesia has a very high probability of achieving over 60,000 beneficiaries over the project period.

DGNREEC - BUDGET YEAR 2013				
No	Activities	Unit	Capacity (kW)	# HH
1	MHP through Desa Mandiri Energi (DME)	24	1,791	4,131
2	Rural electrification			
	- PV-VP off-grid 15 kW	104	1,560	6,983
	- PV-VP off-grid 50-250 kW	21	1,860	4,960
	- PV-VP Hybrid 20 kW	4	80	360
3	Pilot: solar plant on-grid 1 MW	1	1,000	0
4	Rehabilitation of RE installation	5	0	0
		159	6291	16,434

DGNREEC - BUDGET YEAR 2014				
No	Activities	Unit	Capacity (kW)	# HH
1	MHP through Desa Mandiri Energi (DME)	21	1,427	3,279
2	Rural electrification			
	- PV-VP off-grid 15 kW	69	1,035	4,633
3	Pilot: solar plant on-grid 1 MW	1	1,000	0
4	PV-VP installation in outer islands	58	2,900	12,981
5	Rehabilitation of RE installation	2	0	0
		151	6362	20,893

3. Project Approach

3.1 Energy Technologies and Services Promoted by the EnDev Project

Support to DGNREEC

As indicated (see Section 1.1), DGNREEC has allocated substantial funds towards rural electrification infrastructure for the next budget years. The fundamental shortcoming of DGNREEC's rural electrification programme is however that it is purely hardware driven, awarding contracts to the lowest bidder, with minimal quality assurance measures in place and no sustainability or community empowerment mechanisms considered.

It is this shortcoming that is being addressed by EnDev Indonesia. From 2009 EnDev 2 (EnDev 2 Indonesia Country Measure) supported the Green PNPM Programme under the Ministry of Home Affairs (MoHA) to ensure the technical quality and sustainability of over 130 micro hydro power (MHP) plants installed by rural communities and managed by Village Management Teams (VMT). This programme not only assisted with the required engineering expertise, but also with building the capacity of the Village Management Teams (comprising a chairperson, operator, treasurer and administrator) to operate the MHP facility sustainably. The MHP sites are also integrated into active monitoring and evaluation interventions by EnDev as a core sustainability mechanism. Based on the substantial expertise gained, EnDev initiated its support to DGNREEC in 2012, by extensively supporting the PV-VP (solar photovoltaic village power) programme of 2013. Through EnDev specialised technical experts were recruited to inspect and review over 100 recently completed PV-VP installations, conduct baseline surveys, train VMTs and introduce an SMS-based communication gateway for further support. Detailed technical compliance and performance results were submitted to DGNREEC for follow-up with the contractors. DGNREEC in turn used the results to enforce contractor accountability, withhold final payments until the demanded improvements are done and verified, and integrated the inspection checklists into subsequent tender procedures as means to alert contractors of the required installation quality.

EnDev Indonesia is technology independent, but with a focus on electrification. It will continue to build on its well-established micro-hydro power (MHP) mini-grid and solar photovoltaic village power (PV-VP) mini-grid track record, but other technologies such as biomass energy (BME) from agro-waste as well as small-scale technologies such as solar pico PV -systems will also be considered. The overall philosophy will be to support rural electrification programmes initiated by the counterpart and other third parties, regardless of technology. As such EnDev Indonesia will limit infrastructure investments and allocate its resources towards technical support services (design, supervision, commissioning, and quality assurance) and sustainability measures (community preparation, rural electrification programmatic and policy support, monitoring and evaluation, sector development and productive-use-of-energy initiatives). This will not only lead to a better cost/benefit ratio in terms of EnDev Euro/person, but also address the actual need of the counterpart.

EnDev Indonesia's counterpart will remain DGNREEC and the main focus of the project will be to continue supporting DGNREEC's rural electrification programmes and strengthening its role as central actor in the (off grid) rural electrification sector. The relationship between EnDev Indonesia and DGNREEC was strengthened considerably with the support of DGNREEC's PV-VP programme under EnDev and a blue print for cooperation is now in place. Under the PV-VP programme, EnDev has established and implemented extensive technical quality assurance approaches, which DGNREEC has incorporated into its formal tendering procedure, contractor negotiations and consulting terms of reference. This vote of confidence was achieved a) because EnDev did not pursue its own agenda, but responded to the need of the counterpart, b) EnDev adheres to a high standard of service quality towards the counterpart, c) EnDev is skilful in recording, monitoring and evaluating its activities in a user-friendly fashion, simplifying replication, and d) EnDev can react faster to needs due to simplified procurement procedures.

In this next phase the cooperation will expand to include policy advice and strengthen DGNREEC's monitoring and evaluation capabilities. The former is a sensitive and lengthy process and will rely on the deepening of the trust relationship between DGNREEC and EnDev Indonesia (it will likely also not lead directly to the quantitative indicator “people reached” within the project time-frame). Through the PV-VP Support Initiative however, EnDev Indonesia has the opportunity to influence DGNREEC tendering documents (by integrating quality assurance criteria for workmanship, improving technical specifications, addressing commissioning processes and determining additional contractor responsibilities). This is an effective way to influence the quality of off-grid installations, rather than attempting to influence national policies, and is directly coupled to actually electrifying people.

In the case of monitoring, EnDev 2 has put comprehensive monitoring and evaluation methodologies in place, while DGNREEC is in the process of launching its own remote monitoring of rural infrastructure performance. Combining and synchronising the systems would not only address the acute data deficiency prevalent currently in DGNREEC[18], but also find a host for EnDev's monitoring systems. DGNREEC is launching a consultancy for operationalizing the remote monitoring systems installed at PV-VP sites and EnDev was requested to support the consultancy through insights into EnDev's monitoring and evaluation system.

Finally, EnDev Indonesia will continue to pursue sustainability measures under DGNREEC's programmes. This will include empowering key stakeholders (particularly service providers, beneficiary communities and local authorities), conducting Village Management Team trainings, supporting the introduction of productive-use-of-energy appliances at beneficiary level and establishing beneficiary support structures for infrastructure troubleshooting (EnDev2 has established an sms-based communication gateway which will be fully operationalized under EnDev Indonesia). Throughout these measures EnDev will engage with suitable private sector partners who can act as service providers to DGNREEC in the future. These partners and their roles are further described below, and building the capacity is an integral part of this project.

The above listed activities are a reflection of consultations held by EnDev with the DGRNEEC Head of Cooperation during the formulation of this proposal. DGNREEC’s support requirements were confirmed as follows:

- Provide technical on-site reviews of rural electricity infrastructure installed by contractors on behalf of DGNREEC. This will provide DGNREEC with confidential technical information regarding the contractor’s fulfilment of obligations and the level of performance of the infrastructure
- Provide beneficiary communities with training on infrastructure operation, maintenance, management and administration. This will be done through on-site individual training and/or group training. In this EnDev Indonesia will closely collaborate with Ministry of Cooperatives (under an MoU currently being negotiated between DGNREEC and Ministry of Cooperatives, cooperatives will be established at the PV-VP sites, to whom ownership of government assets will be transferred, and who will be supported with further capacity development measures)
- Collect technical, social and economic data from beneficiary sites, maintain a user-friendly database and periodically analyse and present data. This will also include closely supporting the monitoring system being established by DGNREEC, while also providing up-to-date information to be disseminated through the DGNREEC “energy information clearing house”.

18 Source: EnDev2 Impact on Sustainability - A Comparative Study (GIZ, 2013) Source: Sustainability comparison between EnDev and non-EnDev micro hydro power (MHP) in Indonesia - Analysis of the long term technical, social, environmental and economic sustainability of the rural energy infrastructure of MHP in Indonesia (A Ranzanici, 2013)

- Provide training and capacity building support to private sector contractors for improved quality products and workmanship. As per DGNREEC, standards are more easily applied to IPP-based infrastructure development, but innovative approaches should be pursued to strengthen (and enforce) the workmanship quality of local contractors.

Support to other ministries

While EnDev Indonesia will be dedicated to DGNREEC, similar support will be extended to other Government of Indonesia Ministries. EnDev 2 has established relationships with Ministry of Home Affairs (through the Green PNPM pilot programme) and will extend support to MoHA's Rural PNPM programme. Discussions with the Ministry of Cooperatives have also been pursued, and supporting their rural electrification programme (currently 10 MHPs are in planning) is a viable option. Furthermore the Ministry of Science and Technology is coordinating a project for electrifying schools, to be launched in 2014, through 15kW solar/battery systems (a total of 367 new earthquake resistant schools in Aceh are the planned beneficiaries). While the extent of field-based support will be budget-dependent, EnDev Indonesia however will consult with these ministries on a regular basis in order to obtain key site data. This will serve to synergise between the different programmes and create a comprehensive database for DGNREEC on MHP and PV-VP installation across Indonesia.

Support to national utility

Through PLN (Indonesia's national electricity utility) an estimated 20,000 households are to be electrified under the 1,000 Island initiative. In collaboration with the GIZ L-CORE project (see below), EnDev Indonesia will engage with PLN to provide planning and implementation support to the grid expansion and off-grid electrification components.

Support to private sector

EnDev Indonesia will however not only focus on public sector cooperation. Synergising rural electrification across Indonesia will require collaboration with the private sector, particularly since technical quality aspects are anchored with private service providers. EnDev Indonesia will engage the private sector at three levels: SME-based technology providers, local NGOs, and large-scale corporations with an energy supply potential. Regarding SMEs, EnDev has already established strong cooperation with a selected number of service providers. Under EnDev Indonesia they will be further groomed towards providing good quality products to rural communities. EnDev Indonesia has elaborated on an incentive scheme, through which these service providers can provide technical improvements and VMT training to communities, and will launch this incentive scheme under the next phase. Ideally, EnDev Indonesia can also influence policies and programmes under DGNREEC that will more actively engage Indonesian private sector in rural electrification, beyond short-term infrastructure supply, but towards more long-term energy service provision.

EnDev2 has established working relationships with local NGOs and will strengthen this further, as NGOs often have community presence and an interest in providing services to communities (for instance, a number of NGOs participated in EnDev 2 VMT training of trainers courses). NGOs are particularly proficient in catchment area management and resolving community conflicts.

As for large-scale corporations, EnDev Indonesia is in a unique position to draw on the cooperation with another GIZ project L-CORE (Least Cost Renewables; BMU-funded). L-CORE is collaborating with the Indonesian agro and fishing industries to reduce diesel fuel consumption through utilising renewable energy technologies. These industries are often located in rural areas and potential surplus electricity from improved power generation (for instance by using agro-waste) could be distributed to rural villages. EnDev Indonesia recognises a number of long-term positive social, economic and environmental spin-offs in collaborating with large industry, and while no substantial resources will be dedicated towards this, EnDev Indonesia will strive to collaborate with L-CORE.

Overview of core activities

The EnDev Indonesia project approach can be summarised as follows:

As an overall objective, EnDev Indonesia will create synergism between different rural electrification initiatives by a) supporting electrification implementation by different public and private sector actors, b) pursuing efficient coordination mechanism through consolidated data monitoring and evaluation, c) supporting DGNREEC to link electrification programmes and plans on national levels and d) compile and disseminate unified best practices.

The counterpart DGNREEC will be extensively supported by a) providing expert technical design and commissioning of off-grid infrastructure, b) undertaking empowerment and skills development for beneficiary communities, c) pursue sustainability measures, strengthening the business model, such as productive-use-of-energy, d) integrate EnDev and DGNREEC monitoring and evaluation systems for effective future planning and e) provide policy advice and guidance for sustainable rural electrification programmes and to further strengthen its role as the central driver in the rural off-grid electrification sector in Indonesia.

Other Government Ministries such as MoHA and Ministry of Cooperatives, will be supported by a) providing expert technical design and commissioning of off-grid infrastructure, b) undertaking empowerment and skills development for beneficiary communities, c) pursue sustainability measures such as productive-use-of-energy, d) capture and submit data to EnDev/DGNREEC monitoring and evaluation systems for effective future planning and e) provide policy advice and guidance for sustainable rural electrification programmes

Local SME-based service providers will be supported through a) enhancing their quality assurance measures for the manufacture of technologies, b) empowering them to transfer maintenance and administration skills to beneficiary communities and c) migrating them from pure technology delivery and installation to energy service delivery (on an independent Power Producer basis).

Throughout all activities, EnDev Indonesia will maintain its current level of a) performance monitoring and evaluation, b) support systems for beneficiary communities (such as SMS-gateway), c) engagement of stakeholders and d) recording, presenting and publishing reports and information materials, using traditional dissemination, but increasingly digital dissemination (such as energypedia) and audio/video dissemination.

3.2 Approach to Provide Electricity to Households

EnDev Indonesia will support rural electrification programmes initiated by the counterpart (and others) by supporting access to electricity primarily through mini-grids. The vast majority of sites will be located in the outer islands of Indonesia, with extreme distances and poor accessibility to the local national grid (furthermore the national grid will likely be diesel-fuel based and thus electricity supply is costly). As a minimum, EnDev Indonesia will conduct technical inspections of the sites (providing feed-back for follow-up with contractors), conduct technical, social, economic and environmental baseline surveys (for future monitoring and evaluation), train the community VMT (on operation and administration of the systems) and include the site into the SMS-Gateway communication ("hot line" for VMT support). Indicators achieved under this minimum intervention are proposed to be counted at 90%.

Under EnDev2, the average energy supply per household, across 152 MHP and 51 PV-VP sites supported (status 23 July 2013), is 1.57kWh/day (assuming 40% availability factor). EnDev Indonesia will maintain similar (tier-4) levels of energy service. The household occupancy rate in Indonesia is an average of 4.3 persons per household.

3.3 Approach to Provide Clean Cooking Technologies to Households

Social institutions (SI) like religious buildings, community centres, schools and health facilities perform vital community services. Under EnDev Indonesia the connection of SIs will be

explicitly pursued under mini-grid programmes. In the case of off-grid charging stations, they can be attached to SIs where no appropriate rural business is available. SI connections will be recorded and reported on a case-by-case basis, as the type and quantity of SI connected to a mini-grid is site specific. There is a clear demands for electrification of SIs in rural communities, and SI generally also enjoy priority status due to its important function in the community. During EnDev2 reporting in June 2013, a total of 750 SI were connected in over 300 rural villages (thus an average of >2 SI per location).

3.4 Approach to Provide Access to Modern Energy Services for Social Institutions

SMEs can be highly effective at increasing the availability factor and revenue of MHP. Energy supply is often constrained as priority is given to consumptive energy supply to households (for instance MHP plants do not operate during the day [average 60% availability], making many potential rural businesses unfeasible). EnDev2 launched a pilot project, through which electrical appliances were provided to rural businesses, against condition of paying a higher tariff, and MHP operating time be extended. Profit generated by the MHP from electricity sales increased by more than 60%[19], while availability factor increased to as much as 90%. In addition business profit also increased in most cases.

EnDev Indonesia will put specific emphasis on rural small-scale businesses (carpentry, blacksmith, home industries) as a key sustainability measure. This emphasis will comprise sensitising the community, identifying PUE potential during planning phases, ensure that PUE energy requirements are considered during planning phases, and collect and disseminate PUE case studies and examples.

3.5 Approach to provide Access to Modern Energy Services to SMEs

This proposal provided a brief overview of several demand-based interventions through which EnDev Indonesia will obtain its planned outcomes. While support to DGNREEC remains the central pillar of this proposal (as it provides project legitimacy, build on a recognised and established support mechanism and offers a high degree of planning surety), other opportunities will be pursued with vigour. This ensures that EnDev Indonesia maintains both flexible in terms of its activities, while still remaining focussed on achieving its outcomes. Particularly private sector collaboration shows much scope, but innovative approaches are required, as Indonesia builds its fledgling renewable energy sector.

4. Expected Impacts of the Project Intervention

Impact	Possible Indicators
Environment	Sustainable MHP operation is highly dependent on catchment area health and integrity. EnDev Indonesia will put greater focus on catchment area management, collaborating with knowledgeable environmental NGOs. Not only will this contribute towards localised environmental protection, but collective forest protection will serve towards mitigating climate change. Activities will include: • community sensitisation at all supported MHP sites conducted • VMT training on catchment area management at all supported MHP sites Impact: Decline of forest cover at MHP sites will be halted and reversed

19 Source: EnDev Indonesia - Productive Use of Energy - Findings of Pilot Project (GIZ, 2013); Source: PUE Implementation Report Final (EnDev Indonesia, 2012), Source: PUE Database Explanatory Manual (GIZ, 2012)

Health	Health care facilities are connected to MHP and PV-VP systems where available in the village. In addition awareness materials about main health issues will be disseminated at sites during surveys and performance assessments. Activities will include liaise with relevant institutions to obtain health-related information materials and disseminate information Impact: Level of health awareness at MHP and PV-VP sites will increase and instances of avoidable accidents and illnesses decline
Poverty/Livelihood	Findings of the EnDev2 PUE pilot will be disseminated and thus local economic development (LED) fostered as an integral MHP and PV-VP sustainability mechanism. Activities will include: • Liaise with relevant LED institutions and raise importance of PUE • VMT training on PUE at all supported MHP and PV-VP sites Impact: Greater diversity of income generating activities and higher level of economic prosperity at MHP and PV-VP sites will be attained
Education	Education facilities are connected to MHP and PV-VP systems where available in the village and schools will be used as platform to disseminate information on energy, PUE and environment. Activities will include education materials compiled and disseminated at schools Impact: Greater exposure to Indonesia-relevant information on energy, PUE and environmental issues in schools at MHP and PV-VP sites will be attained
Governance	Technical planning, design and implementation under DGNREEC programmes improved through EnDev Indonesia guidelines, which will lead to higher quality PV-VP and MHP installations. Activities will include: • Contributing towards tender specifications for MHP and PV-VP procurements • Community empowerment and skills development integrated into DGNREEC programmes and tender requirements • VMT trainings conducted by third parties as per DGNREEC requirements • Engaging the private sector towards undertaking rural electrifications through a conducive policy framework and with attractive financial returns Impact: GoI, but at least DGNREEC, rural electrification programmes incorporate adequate attention for sustainability measures and capacity development

5. Budget

		EUR
1	Human resources and travelling	1,955,000
2	Equipment and supplies	126,000
3	Funding financing agreements/local subsidies	70,000
4	Other direct costs	400,000
5	Total direct costs (sub-total)	2,551,000
6	Mark up costs/administrative overheads/imputed profit	409,000
7	Cost price	2,960,000

Kenya

Promoted technology	Stoves / Pico PV systems		
Project period	Old: 07.2009 – 12.2014 New: 07.2009 – 12.2015	**Project budget:**	Old: EUR 6,800,000 New: EUR 7,800,000

Target Groups	Rural/peri-urban poor
Lead Political Partner	Ministry of Energy and Petroleum
Implementing organisation	GIZ in cooperation with SNV
Implementing partner	Ministry of Agriculture, Aphia Plus (US funded), Kenya Tea Development Authority, German Agro Action
Involved bilateral / multilateral programmes	GIZ projects Adaptation to Climate Change, Water Sector Reform, Health Sector Reform, Promotion of Private Sector Development in Agriculture, PPP response to Climate Change in Tea Sector
Summary of Key Interventions and Outputs	- Promotion of sustainable production, marketing and dissemination improved cookstoves and small solar systems including awareness creation - Training of stove and solar entrepreneurs - Creation of linkages between entrepreneurs and clients - Lobbying at policy level - Participation in development of standards and licensing processes

Target (number of beneficiaries)	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	40,000	40,000	people
Cooking energy for households	3,730,000	3,900,000	people
Electricity and/or cooking energy for social infrastructure	600	750	institutions
Energy for productive use/ income generation	600	750	SMEs
Project Manager	Name: Reimund Hoffmann, email: reimund.hoffmann@giz.de		

1. Situation Analysis

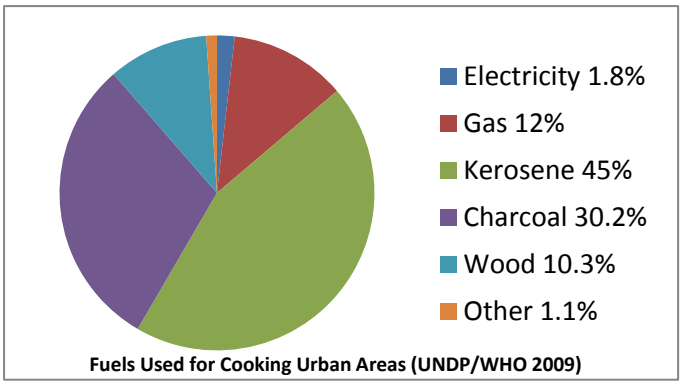
1.1 Energy Situation

Analysis of the national energy trend shows heavy dependency on biomass which accounts for 68% of the total energy consumption while petroleum accounts for 22%, electricity 9%, and other sources about 1%.

The majority of Kenyan households depend on traditional biomass resources, including fuel wood and charcoal for cooking. Firewood as the main cooking fuel is used by 68.8% of the households at the national level, and 84.4% of rural households. Many people are engaged in production, transformation, transportation and sale of wood and charcoal, making it one of the most important sources of paid livelihoods. As a result woody biomass is diminishing; poor management and utilisation in unsustainable ways accelerates this development.

While firewood, charcoal, paraffin and LPG remain the main sources of cooking fuel, kerosene is the main fuel for lighting. The Ministry of Energy highlighted in its 2009 Annual Report that 84% of Kenyans without access to electricity are willing to invest in photovoltaic solar lanterns (PSL).

In urban areas 32% of households use electricity as the source of lighting, although kerosene lamps still remain the main source with 55%.

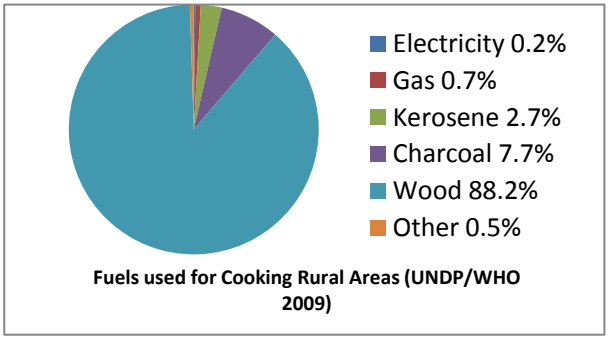


Fuels Used for Cooking Urban Areas (UNDP/WHO 2009)

In rural areas electricity is used by about 26%, but an estimated at 87% of households use kerosene for lighting, either solely or in combination with electrical power.

The Government of Kenya states in its Vision 2030 the aim to make Kenya "kerosene free" and therefore promotes such systems.

Fuel wood is by far the leading energy resource for Kenya. In the past years progress has been made in disseminating efficient technologies for biomass utilisation. A high share of the population still uses firewood for cooking and the majority still cooks on the traditional and inefficient three stones fire place.



Fuels used for Cooking Rural Areas (UNDP/WHO 2009)

Within the current phase of the EnDev Kenya programme, GIZ has facilitated the dissemination of a significant numbers of improved cook stoves (ICS). In addition GIZ has promoted the uptake of ICSs by institutions and enterprises using firewood, such as hotels.

With these efforts is was possible to cover about 24% of the country's approx. 6 million rural households. Many people without improved stoves still do not know where to get them, although they desire to acquire them. Current improved stove production centres and trained technicians do not meet the demand. This continues to contribute to unsustainable harvesting of biomass with negative impacts on the environment. Up-scaling of improved cook stoves is therefore still necessary.

Electricity access in Kenya is low despite the government's ambitious target to increase rural electricity connectivity from the current 26% to at least 65% by the year 2022 and 100% by 2030. The government acknowledges the crucial role renewable energy can play in enhancing energy access, especially in rural areas, and is working to increase renewable energy use, particularly for rural electrification, by incorporating 40% of renewable energy. Nevertheless, due to funding constraints, priority has been given to provide access to sub-county headquarters, secondary schools, health facilities and trading centres. This leaves out dispersed rural households and equally needy smaller settlements.

Lack of clean energy for lighting has major gender related repercussions such as indoor air pollution and adverse effects on eye sight due to poor quality lighting for studying, especially for children. By extension, education standards are likely to be adversely affected as a result of lack of quality lighting.

1.2 Policy Framework, Laws and Regulations

In Kenya, several policy and legal framework documents are relevant for the energy sector, including energy production and use and biomass energy. Among them are:

- Sessional Paper No. 4 on Energy of Kenya
- Energy Act 2006
- Kenya Vision 2030
- The Kenya National Climate Change Response Strategy
- Scaling up renewable energy programme

- Kenya Bureau of Standards- ICS 97.040.20 (DKS 1814-1:2013)
- Energy Regulatory Commission: Energy (Improved Biomass Cookstoves) regulations 2013 (legal Notice No 12 of 2006)

The Kenya Forest Service plans to have 10% forest cover nationally and promotion of environmentally friendly technologies, reducing consumption of firewood will be one of the intervention.

All these touch on biomass energy in one way or the other, however not in the same prominence as petroleum or electricity.

Kenya's Vision 2030 is the current economic development strategy, which has the aim to drive the country into a globally competitive and prosperous economy with high quality of life. Energy has been recognized as a key driver to achieving the strategy, since it calls for escalating access to electricity. Guided by Vision 2030, two government energy programmes have been set up to enhance access to electricity, namely the:

- The Energy Access Scale-Up Programme
- The Rural Electrification Programme

Kenya does not provide incentives or subsidies for household solar PV systems. Although some strides have been made to improve energy efficiency and renewable energy in Kenya by the government, some planned reforms in the Energy Act are yet to be effected. These include:

- Establishment of a Centre of Excellence for Energy Efficiency and Conservation
- Establishment of energy and equipment testing laboratories
- Development of standards and codes of practice on cost-effective energy use

The Stockholm Environment Institute (SEI) conducted a study on the economic impacts of climate change in Kenya in 2009 and found that the country's greenhouse gas emissions are rising quickly. The emissions are estimated to have increased by as much as 50% over the last decade. As such Kenya's Climate Change Response Strategy is keen to reduce these impacts through various avenues including promoting use of environmentally friendly energy, among them improved cook stoves.

1.3 Institutional Set-up in the Energy Sector

There are a number of public and private institutions that are relevant for the energy sector in Kenya, which include:

- Ministry of Energy and Petroleum (MoEP) is the primary government organisation responsible to develop and articulate energy policy and govern the energy sector in Kenya. It is mandated to provide an enabling environment for the energy sector.
- Rural Electrification Authority (REA) was founded in 2006 and is mandated to implement the Rural Electrification Programme in Kenya as well as to update the rural electrification master plan and promote renewable energy in Kenya. It reports to the MoEP.
- Energy Regulatory Commission (ERC) was also established in 2006 and is the government agency responsible for technical and economic regulations in the energy sector. Currently there are two solar documents open for public debate and input to regulate solar photovoltaics and solar water heating. The Energy Regulatory Commission is also in the final stages of putting in place regulations for the improved cookstove sector in Kenya, especially with regard to production, importation and use.
- Kenya Energy Generation Company (KENGEN) is a parastatal company and generates the bulk of Kenya's electrical power, mainly through geo-thermal and hydro power plants.
- Kenya Power & Lighting Company Limited (KPLC) is the institution responsible for electricity distribution and supply in Kenya. It buys all the power generated in Kenya through negotiated purchase power agreements and then distributes it onwards to consumers. KPLC only deals with grid connected power supply.

- The Kenya Bureau of Standards (KEBS) is responsible for setting the standards of all products manufactured and sold in Kenya. Currently KEBS is in the process of setting up standards for ICS in collaboration with the sector players, mainly MoEP, Ministry of Agriculture, KIRDI, ISAK, EnDev and SNV.

1.4 Major Donor Activities

The initiatives by development partners on renewable energy in Kenya include:

- **Agence Française de Développement (AFD):** Conversion of diesel generators into hybrid generators (wind, solar, biomass) and retrofitting of existing and new minigrids with renewables; Scaling up of a pilot revolving fund to enhance connectivity in Kenya, complemented by Compact Fluorescent lamps (CFL) distribution component; Support to the geothermal development company and funding of a national geothermal master plan; Credit line to commercial banks to promote renewable energy and energy efficiency projects in the agri-business and hostelry sectors
- **Department for International Development (DFID**): Installation of solar diesel hybrid stations for isolated mini grids (green fields);
- **World Bank/IDA**: Installation of solar diesel hybrid stations for isolated mini grids (green fields); Generation, transmission, distribution, off-grid, renewable energy (small hydro, solar, wind, or biogas)
- **Nordic Development Fund:** Installation of solar diesel hybrid stations for isolated mini grids (green fields);
- **Japan International Cooperation Agency (JICA);** Capacity development for promoting rural electrification using renewable energies in Kenya; establishment of rural electrification model using renewable energy, mainly solar in public institutions like schools, dispensaries and administrative units
- **IDA/ IFC/ GEF**: Support to innovative renewable energy lighting products (Lighting Africa)
- **European Commission:** Installation of energy systems in 20 target institutions, 2 wells using solar technology to pump water and one community well using wind energy to pump out water; Increase access to modern, affordable and sustainable energy services for 268,000 households, 48 institutions and 48 rural community based groups in rural and peri-urban areas in Kenya; Improving the access of poor people to sustainable and affordable energy services in a perspective of combating climate change
- **EU Energy Facility and HIVOS:** Provision of access to affordable funding for energy entrepreneurs; Provision of access to modern energy access to 9,000 households
- **Government of Finland:** Village lighting and electrification for productive purposes
- **Government of Spain:** Provision of electricity to schools, health facilities in arid and semi-arid lands
- **Government of Norway:** Planned: Energy Plus – Norwegian energy access programme under the MoEP to promote ICS and solar lanterns –EnDev might support the Ministry in its implementation
- **UNEP/GEF:** Reduction in CO_2 emissions resulting from increased energy efficiency within Kenya's small and medium enterprises
- **UNDP:** Promotion, development and distribution of sustainable energy services to serve basic household needs, income generating opportunities and service economy. This will address areas of capacity building, solar thermal, bio-fuels, pico PV and micro hydro, wind energy, feed in tariffs for wind, solar and biomass, biogas development, biomass gasification and East African energy scaling up strategy; Support to remove barriers to market transformation to energy efficient products and services in Kenya with a replication effect to the four other East African Countries (EAC)

2. Planned Outcome

Energy Service Segment	Old target	New Target
Energy for Lighting & Electric HH Appliances	40,000 people	40,000 people
Cooking Energy for Households	3,730,000 people	3,900,000 people
Electricity and/or Cooking Energy for social infrastructure	600 institutions	750 institutions
Energy for productive use/ income generation	600 enterprises	750 enterprises

3. Project Approach

3.1 Energy Technologies and Services Promoted by the EnDev Project

The EnDev Kenya country programme (EnDev-K) will continue to facilitate promotion of proven clean household cooking technologies as well as energy efficient cookstoves for institutions and small businesses.

The focus will remain on establishing sustainable markets for clean cookstoves and small solar systems, and hence development of entrepreneurs in rural areas will be the key activity.

The programme will take into consideration the new Kenyan governance system with focus on counties. Decision making process under devolved county government is seen as crucial in supporting the programme implementation, especially with regard to inclusion and funding of energy access interventions in the county development plans.

The programme will continue to promote the use of Jiko Kisasa (JK) stove and the rocket stoves (RS). The use of quality materials such as inserts (clay combustion chamber) or brick, sand and cement for constructing of RS will be emphasized to increase the stove life span. The use of locally available materials offers environmentally friendly and cost effective technology solutions for cooking.

Major activities will further include promotion of sustainable production, marketing and dissemination of ICS, awareness on availability and use of ICSs for households, social institutions and those using wood fuel for productive use. EnDev-K will gradually move out of intervention areas with a high coverage rate (>60%) and move into new counties with no known stove activities so far.

Through the proposed up-scaling, an additional 170,000 people will get access to modern forms of cooking. In addition, around 150 social institutions like schools will be targeted for the dissemination of institutional rocket stoves. Social institutions spend a significant part of their budget to purchase fuel wood, and most of them use inefficient technologies for cooking. ICS offer a viable solution for those institutions willing to invest, which can reduce their energy costs. Sensitisation about the available technologies, access to trained technicians and how to use and maintain the stoves will be part of the package on offer to social institutions.

An additional 150 small and medium size enterprises such as restaurants and hotels, but also in the agro-processing sector, are also targeted as clients for institutional rocket stoves. Especially in restaurants wood fuel is an important cost factor; hence a rocket stove will reduce these costs and increase the enterprises' profit margins. The same measures will be applied as for institutions.

3.2 Approach to Provide Clean Cooking Technologies to Households

The on-going activities for promotion of fuel saving cookstoves will be scaled up. The geographical outreach will be extended to six Counties in addition to the 14 Counties with current activities. Preparation at county level is on-going to set good ground to get started. There is a great interest at county level, as they have seen the impacts of promotion of ICS on the environment as well as on the local economy. The current proven approach will be further applied, i.e. EnDev will focus on awareness creation, identification and capacity building of stove producers, installers and marketers, creation of linkages between relevant stakeholders and assurance of quality. Monitoring of all activities will be an integral part of the project.

The Improved Stoves Association of Kenya (ISAK) will remain an important partner in all activities. ISAK was formed with EnDev-K's support; partly as an exit strategy for the project and also to lobby and articulate improved cookstoves (ICS) issues at various platforms. ISAK is also cooperating with investors, stakeholders and users for mutual benefits. Currently ISAK has been selected by Kenya Women Finance Trust bank (KWFT) to support promotion of ICS among its members. The target for the first year is that 200,000 women have access to a bank loan and use it to specifically acquire an ICS. ISAK has – after a competitive bidding process with other entrepreneurs promoting different stove types – been awarded the contract to implement this initiative. This success shows that ISAK is getting stronger and is partly able to fulfil its role. EnDev Kenya's role will be in building capacity especially in areas where ISAK does not have trained technicians, awareness creation and consumer education.

The existing collaboration with Kenya Tea Development Agency (KTDA) will be expanded. As KTDA shifted from using coal in their furnaces to firewood, there is a great interest in the agency to preserve as much firewood as possible around the factories. The factories are the entry points for stove promotion.

Collaboration with the USAID-funded project Aphia Plus is still going on. The focus is in making use of the Village Savings and Loans Group concept, which has been developed by Aphia Plus. Under this concept, people will be able to access loans to buy a stove or solar lantern. EnDev's main role is in the areas of awareness creation on the technologies, capacity building of stove producers, marketers and users, whereas Aphia Plus' objective is to improve livelihood in general, ICS being part of this, but not reported on as a specific item.

Winrock International is implementing a project in the Western part of the country with focus on youth engagement. It offers financial access (grants) to youth groups. Discussions have been initiated to get the youth involved in both stove and solar activities while making use of the available funds to start small businesses on stoves and solar.

In areas outside the clusters, collaboration continues with religious organisations, e.g. the Catholic Diocese of Kitui (in collaboration with FASTENOPFER, Swiss Catholic Lenten Fund) in ICS awareness creation, training of technicians and mobilising the target communities

The Clean Cookstoves Association of Kenya (CCAK) is an affiliate of the Global Alliance for Clean Cookstoves (GACC). EnDev Kenya has played a key role in its establishment and is currently a member of the initial CCAK interim secretariat; in which EnDev holds the positions of secretary and treasurer, until new structures are in place after the first general meeting. EnDev will, however, continue to play an active role in CCAK operations.

The project has reached high penetration rates of stoves in some areas. A decision was made recently to scale down programme activities in areas where good coverage, i.e. more than 60% of the households has been achieved and move to new ones. Close supervision will be stopped and the stove association will take charge of all technical matters on materials, design, sizes, requests for testing, major awareness or promotion campaigns. The project will only respond when called in. This will provide an opportunity for the programme to test the viability of entrepreneurs to operate without close supervision of the project. The intention is also to go back in approx. two years and carry out a study in these areas to find out the progress.

3.3 Approach to Provide Access to Modern Energy Services for Social Institutions

Within the on-going phase, the dissemination of energy efficient cook stoves for social institutions promoted by EnDev has not been very successful.

The main reasons for the slow speed are assessed as follows:

- Budgetary problems in public institutions, i.e. if an investment in stoves is not captured during budget preparation, the institution needs to wait for another year. Due to change of responsibilities this is often forgotten while preparing the new budget. In case of budget reductions, new investments are often seen as non-priority areas.
- The decision making process for public institutions is very long and tedious, making it not very attractive for private builders to pursue this market.
- Many private institutions have already installed improved cook stoves; hence this market is widely saturated.
- Builders do not have adequate skills to market the stoves in schools.
- Most institutions prefer the stove supplier / builder to cover all costs and then pay in instalments, which most technicians cannot afford
- Public procurement procedures require that bidders are a registered business with the Kenya Revenue Authority (KRA), which most of the small enterprises are not.

Under this proposal EnDev will address these issues more intensively. EnDev is part of an inter-ministerial working group on standards and legislation. It is foreseen that the installation of standardized energy-efficient cookstoves will be mandatory for all institutions, which would give a tremendous market boost to the sector. In addition, EnDev will use school board meetings to sensitize the decision makers at local level. Special attention will be paid on training of stove builders to improve their marketing and increase sales of their products to decision makers in public boards and county administration. EnDev will also support stove builders to get registered with KRA (Kenyan Regulatory Authority) once they reach a certain annual turnover. KRA registration will be a requirement for being licensed by the respective authorities. In addition, EnDev-K will facilitate linkages between financial institutions and stove entrepreneurs. ISAK and CCAK will be major collaborators in these EnDev-K interventions.

The county governments open up a new window of opportunity in this area, as it is within their interest to improve service within their county. In a number of meetings it became clear that the counties are interested to have all schools use ICS to reduce their firewood consumption. The programme is supporting the counties on how they can get this implemented.

3.4 Approach to Provide Access to Modern Energy Services to SMEs

In the on-going phase the results for this segment are also low. A limiting factor is that most hotel and eating house operators usually rent the premises they are operating in and are hesitant to invest in (semi-)permanent structures such as rocket stoves. EnDev-K will therefore look into the option of promoting portable stoves for this target group.

Most artisans still find it difficult to access credit from lending institutions to undertake “big” jobs. As mentioned above, EnDev-K will facilitate linkages between financial institutions and stove entrepreneurs.

On the other hand, the new county officials, especially from the Public Health Department, are taking smoke emission in public places as a serious threat to health. This opens an opportunity to collaborate with them to educate hotel operators to adopt improved cookstoves.

Therefore EnDev will work closely with the Public Health Offices to sensitize the food business and train stove producers and marketers in marketing their products better. This again is one area which the county government can influence to increase the uptake of ICS for SMEs. In addition, moving to new counties also opens new business opportunities for stove builders. EnDev-K will incorporate issues of addressing SMEs in the training of newly recruited entrepreneurs.

4. Expected Impacts of the Project Intervention

(The figures below are based on the achievements from the start of the project until 12/2014.)

Impact	Possible Indicators
Environment	The annual firewood reduction will amount up to 1,602,292 t, which is equivalent to approx. 88,038 ha of prime forest. It also reduces annual CO_2 emissions by 1,053,562 t. In 43,000 households with photovoltaic lighting systems, kerosene consumption is reduced by 2,580 t per year, which leads to reduction of CO_2 emissions approx. 116,000 t.
Health	In at least 1,463,280 households indoor air pollution is reduced by at least 30%, thus reducing respiratory diseases. The risk, especially for children, of burns is reduced by at least 50%.
Poverty/Livelihood	The cost for purchase of firewood is reduced by at least 50%. The time for firewood collection is reduced by at least 50%. The time for cooking is reduced by at least 30%. The annual income from stove production and sales amounts to up to KES 17,000,000 million (approx. EUR 170,000 million) Annual savings on firewood when purchased amounts up to KES 250,000,000 from the additional 34,000 stoves. Up to 13,000 households have improved their living conditions through the provision of clean lighting energy.
Education	Up to 129,000 children have improved their learning facilities by availability of light solar
Governance	Communities living around forest conservation areas play an active role by adopting ICS.

5. Budget

		EUR
1	Human resources and travelling	381,100
2	Equipment and supplies	59,600
3	Funding financing agreements/local subsidies	39,300
4	Other direct costs	394,375
5	Total direct costs (sub-total)	874,375
6	Mark up costs/administrative overheads/imputed profit	125,625
7	Cost price	1,000,000

Malawi

Promoted technology	Stoves		
Project period	Old: 12.2012 – 04.2014 New: 12.2012 – 12.2014	**Project budget:**	Old: EUR 250,000 New: EUR 500,000

Target Groups	Urban and peri-urban firewood using households
Lead Political Partner	Ministry of Environment and Climate Change Management
Implementing organisation	The local non-profit Organisation "MAEVE" in cooperation with GIZ
Implementing partner	Stove producers, private sector, PR and marketing specialist
Involved bilateral / multilateral programmes	National Improved Cookstove Task Force (Irish Aid funded), Presidential Initiative '2 million stoves for Malawi by 2020' DISCOVER programme (UK aid, Irish Aid and Norway funded), IRTICP (Irish Aid funded), COOPI (EU funded), Mbaula Network
Summary of Key Interventions and Outputs	Enhance sustainable supply of the energy efficient cookstove "Chitetezo Mbaula" established by EnDev-ProBEC • Increase production capacities of most enterprising production groups in strategic areas to supply major urban markets • Increase decentralised production capacities countrywide to reduce transport needs to district capitals • Offer marketing services to existing producer groups who have difficulties finding markets for their stoves • (Re)train producer groups on quality standards of stoves in line with the dimensions and criteria agreed by the National Task Force • Support National Task Force in quality assurance and standards developments Facilitate a distribution system to new markets in urban areas by creating outlets and sustainable sales structures for fuel-saving firewood stoves in the major urban and peri-urban areas: • Promote and support transportation of stoves to urban areas • Expand outlet network countrywide in cooperation with key strategic partners like filling stations and supermarket chains etc. • Continue awareness campaign Strengthen sales outlets with marketing campaign in April-June 2014

Target (number of beneficiaries)	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	0	0	people
Cooking energy for households	62,500	125,000	people
Electricity and/or cooking energy for social infrastructure	0	0	institutions
Energy for productive use/ income generation	0	0	SMEs
Project Manager	Name: Marco Hüls, email: marco.huels@giz.de		

1. Situation Analysis

1.1 Energy Situation

Given its relatively small land-mass, large (and growing) population and heavy dependence on fuel wood, Malawi is an increasingly energy-stressed country. The National Energy Policy estimates that 93% of total energy demand is met by biomass energy. Households consume 84% of the total primary energy. A staggering 99% of household energy is supplied by biomass. This, with increasing population growth, is exerting significant pressure on the country's forest resources, leading to forest degradation and deforestation at a rate of 2.6% per year. 87% of the population uses firewood and 8% charcoal to satisfy their thermal energy needs. Less than 7% of the 14 million people are connected to the national grid. The connected demand far exceeds the supply of 320 MW installed generation capacity. Thus, load shedding is frequent. Less than 2.3% of the total national energy demand is met by electricity, 3.5% by liquid fuels and gas, and 1% by coal. [20]

Electricity and gas are only intermittently available and considered to be too expensive for cooking. Electricity tariffs were raised by 84% in 2013. Therefore firewood and charcoal are the major cooking fuels, even in the urban areas.

Most of the charcoal is consumed in urban areas – representing 46% of total demand. Unlike in many neighbouring countries, firewood is still available in all four major cities of Malawi (Lilongwe, Blantyre, Zomba and Mzuzu) as well as in the district capitals. Firewood provides over 50% of the urban cooking fuel and nearly 100% in the rural areas.

Even in urban areas, firewood is mainly used in open three-stone fires. Therefore there is a potential to introduce convenient affordable portable firewood stoves in urban areas and shift eventually some parts of the cooking activities currently done with charcoal to a less primary-energy intensive fuel source, meaning un-carbonised firewood.

Charcoal in Malawi is mostly unsustainably produced from live trees: over 60% of the charcoal is made from wood originating from protected Forest Reserves and National Parks; even firewood is unsustainably collected.

One of the poorest countries in the world, it is estimated that Malawi's GDP would be 5.3% higher if such unsustainable use of natural resources ended. Forest and soil degradation are considered some of the main contributors to these losses. Charcoal will be produced increasingly further away from the cities, and households must spend more for their cooking fuel. There is a rising tendency to import charcoal from the neighbouring countries Mozambique, Zambia and Tanzania, leading to severe negative environmental impacts in these countries.

The Maplecroft's Climate Change and Environment Risk Atlas shows that Malawi is increasingly vulnerable to the impacts of climate change. According to the new Climate Change Vulnerability Index (CCVI) there are 30 countries at ‚extreme risk' worldwide. Malawi moved fast from position 15 in 2011 up to number 9 on this list.[21]

This explains why the newly formed Ministry of Environment and Climate Change Management is supporting the initiative to promote energy efficient biomass appliances like cookstoves to reduce the quantity of solid biomass required for preparing a meal.

In addition exposure to toxic smoke from traditional cooking fires is the world's biggest but least known killer and the exposure is greatest amongst women and girls who do the cooking. Kitchen smoke inhalation among children is a contributing factor to the high incidence of pneumonia that is a major cause of child mortality in Malawi. Improved cookstoves can reduce the smoke emitted during the cooking process, provided that dry wood is used.

[20] Ministry of Energy, http://mbaula.org/index_htm_files/2%20-%20BEST%20Presentation.pdf

[21] http://maplecroft.com/about/news/ccvi_2012.html and http://maplecroft.com/about/news/ccvi.html

Several successful stove projects have already been executed in Malawi, such as those supported by Energising Development (EnDev) through the Programme for Basic Energy and Conservation in Southern Africa (ProBEC) from 2005-2008. However, the lion's share of work in the cookstoves sector has targeted and is targeting rural areas.

According to new data collated by the Global Alliance for Clean Cookstoves from various sources[22], the urban population is growing fast, from 15% in 2008 to nearly 20% at present, equalling roughly 2.6 million people in over 585,000 households at an average of 4.4 members per household.[23]

Urban dwellers are the biggest consumers of non-collected biomass, and their numbers are increasing rapidly. However, the capacity to produce a sufficient quantity of good quality improved cookstoves is still limited in the urban areas. EnDev Malawi has started to enhance stove production and link rural stove producers with distribution and sales structures in the urban areas. This will encourage urban and rural stove producers to grow their businesses and once started, continuing to invest own resources in building up the urban demand for their stoves – building on the successes of EnDev and ProBEC. As there is currently no other donor-supported intervention in urban areas, there is no risk of these stoves being double counted in this green market.

1.2 Policy Framework, Laws and Regulations

The Government of Malawi has as of late demonstrated a commitment to scaling up the use of improved cookstoves to address environmental and health issues. President Banda has a keen interest and passion for maternal and child health and committed the Government of Malawi to promote the adoption of energy efficient clean cookstoves in a letter sent to the Global Alliance for Clean Cookstoves on the 18th of June 2012.

In September 2012, both the Ambassadors of Ireland and the USA met separately with the Minister of the Environment and Climate Change. They both discussed support for the scale up in Malawi of the use of improved energy saving and clean cookstoves. Minister Hara confirmed the Government's interest and commitment to take this programme forward. She also expressed the importance of coordination with the Ministry of Energy and Mining. Meetings were held separately with the Principal Secretaries of each Ministry. A meeting between the Ministry of the Environment and Climate Change (Department of Forestry), the Ministry of Energy and Mining (Department of Energy), the US Embassy and the Embassy of Ireland followed. It was agreed to establish a National Improved Cookstove Task Force that would include the Government, civil society and the development partners. The Task Force was established in March 2013 and is funded by Irish Aid for the first year. MAEVE as EnDev's implementation partner in Malawi is actively participating in the task force.

Older policy documents are currently under revision to reflect the new commitment to embrace biomass energy and make it greener and environmentally friendly.

So far, the Malawi Energy Policy (2003) Part IV (Energy Demand Sectors) Section 4.2.1 (Urban Household Energy Demand) outlines what the Government of Malawi considers to be the most relevant challenges to the energy sector: "...dependency on biomass from unsustainable sources; [...] reliance on end-use devices with low energy efficiency; ... adverse impacts of the urban household energy mix on the environment and on health and safety." The policy document indicates Government's interest in devising "promotional strategies aimed at expanding the use of improved ceramic firewood stoves in poor urban households" and "reducing the proportion of households using three stone cookstoves to 50% by 2020."

The Malawi Biomass Energy Strategy published in 2009 says "For a long time the national policy has been to transform the country's economy from high dependency on biomass energy towards greater reliance on other energy sources, particularly electricity, but the Gov-

[22] http://www.cleancookstoves.org/countries/africa/malawi.html

[23] National Statistics Office Zomba: Malawi Demographic and Health Survey 2010, p. 9 ff

ernment of Malawi (GoM) has recently recognised that a more pragmatic approach to the biomass energy sector is required at the same time... The BEST objective was to develop a rational and implementable approach to the management of Malawi's biomass energy sector through a combination of measures designed to improve the sustainability of biomass energy supply, raise end-user efficiencies and promote appropriate alternatives." However, to date, this Strategy has not been ratified by the Government of Malawi. Yet in a presentation by the Ministry of Energy at a US Embassy organised event in April 2013 there is a political statement that woodfuels will remain the major source of cooking energy in years to come as alternative sources of energy are not readily available. [24]

Malawi's Forestry Policy (1996) Section 2.3.11.2 calls for the development, adaptation and promotion of woodfuel saving devices.

Malawi's Growth and Development Strategy (2006-2011) Section 5.1.1.6 (Conservation of the natural resource base) speaks to the long-term goal of reducing environmental degradation, and the expectation to "ensure sustainable use and management of forestry resources" in the medium-term. It also mentions Malawi's high rate of deforestation and how this accelerates soil erosion and erodes natural resource-based livelihoods – attributing it to a high dependence on wood as a source of household energy (among other factors).

National Policy on Acute Respiratory Infections Control in Malawi 2nd Edition (2007) in Section 2.6 has as an objective "to advocate for well ventilated cooking areas and dwelling houses" as a means of achieving their vision for the Acute Respiratory Infection Programme to keep all children free from the burden of acute respiratory infections. It also refers to the promotion of cleaner energy and lighting sources at household level in Section 5 (Information, Education, Communication, Advocacy and Social Mobilization).

The proposed upscaling of firewood stove promotion by EnDev is in line with all policies and has the full support of the newly formed National Improved Cookstoves Task Force.

1.3 Institutional Set-up in the Energy Sector

Partially as a result of the previous lobby-work by EnDev-ProBEC for improved cookstoves, there are at present a significant (and growing) number of organisations and institutions recognising the importance of solid biomass energy for Malawi. It becomes finally acceptable to acknowledge that biomass is the most common and readily available source of household energy in both rural and urban Malawi and will continue to be in the short and mid-term.

In March 2012 representatives of various organisations signed on to the Global Alliance for Clean Cookstoves (GACC) and the launched MBAULA – Movement for Bio-energy Advocacy, Utilization, Learning and Action – a network for producers, implementers and stakeholders in improved biomass cookstoves in Malawi[25].

Following the event and with special encouragement by the Ambassadors of Ireland and the USA, the Malawi Government signed up as a national implementation partner with the GACC in June 2012.

In 2013 following the presidential initiative for improved cookstoves, the national government-led Improved Cookstove Task Force was formed and assigned the following broad functions:

- Conduct a national cookstove market assessment
- Develop a National Cookstove Adoption Strategy and strengthen Government's capacity to implement it
- Provide a clear definition of what is meant by an improved cookstove and establish standards to regulate the production of cookstoves in Malawi
- Prepare a national awareness communication and education strategy that will target both rural and urban consumers with segmented communication plans, and

[24] http://mbaula.org/index_htm_files/2%20-%20BEST%20Presentation.pdf
[25] http://mbaula.org/membership_founders.htm

- Establish support for the production and commercialisation of energy saving stoves whilst promoting research and innovations that will drive improved cookstove adoption and usage.
- Scaling-up current cookstove and carbon credit activities

The national Improved Cookstove Task Force reports to the national Renewable Energy Technical Working Group to ensure that its activities are in line with national strategy and policy in the wider field of renewable and sustainable energy. The Task Force is co-chaired by Government (Ministry of Energy and the Ministry of Environment) with administrative support from Concern Universal. Other members of the Task Force include donors, NGOs, Academia, Government and private sector representatives. The EnDev implementation partner MAEVE is one of the two NGO-representatives in the National Cookstove Task Force since August 2013.

1.4 Major Donor Activities

With additional support by DGIS, the regional ProBEC Programme laid the foundation of the current cookstove activities on a national level in Malawi, contributing to the creation of the global programme Energising Development. EnDev-ProBEC developed and mainstreamed energy efficient technologies in Malawi from 2005 up to May 2008. In the course of the years, many development organisations implementing various programmes on health, nutrition, environment, natural resources, food security etc. got encouraged and trained to integrate cooking energy into their programmes as cross-cutting issues. This created quite some momentum for biomass-based cooking energy solutions in the country. The most liked and viable technology was the Chitetezo Mbaula, a simple ceramic firewood stove for households, mostly produced and promoted in the rural areas.

Prior to the new engagement of the EnDev donor-consortium in April 2013, the major donors for biomass energy interventions in Malawi were (in alphabetical order) European Union, Ireland, Norway, UK, UNDP and USA. Major programmes supported by these donors in Malawi were without exception targeting the rural areas. To date, EnDev Malawi is the only programme specifically targeting the urban markets for improved cookstoves.

Major implementation partners are Christian Aid, Concern Universal, Cooperazione Italiana (COOPI), Goal Malawi, Mulanje Mountain Conservation Trust, Self-Help Africa and Total Landcare. Clíoma is an Irish consultancy company providing technical support on energy efficient technologies.

The DISCOVER Consortium hosted a stove camp for cookstove stakeholders in Malawi in March 2012 in collaboration with the Partnership for Clean Indoor Air. The camp focused on enhancing awareness and understanding on biomass energy use and its impacts. The workshop guided participants from partner organisations to understand the science behind biomass energy use and to assess a portfolio of cookstoves being used in Malawi particularly through sessions on stove efficiency testing. The Partnership for Clean Indoor Air is to dissolve itself and its members will now integrate into the Global Alliance for Clean Cookstoves. A coordination network called Mbaula Network was established to coordinate the activities of all the organisations affiliated to the Global Alliance for Clean Cookstoves in Malawi. Renew'N'Able Malawi is facilitating the coordination of the network and a website has been set up.

On April 11, 2012 the United States Embassy in Lilongwe hosted an improved cookstove symposium. The national symposium on scaling up cookstoves in Malawi highlighted the importance of clean cooking practices to Malawi's economic growth, human health protection and resource conservation. The symposium brought together public and private stakeholders including the Government of Malawi (GOM), United States agencies in Malawi, Irish Aid and other development partners, in addition to a range of industry and non-profit groups involved in clean cook stove promotion.

Encouraged by this experience, Ireland and USA agreed to include the promotion and scale up of the use of cookstoves in the US/Irish partnership framework for 2012. Ireland and the USA supported a series of events, to promote the use of clean and efficient cookstoves in Malawi.

The DISCOVER programme with additional financial support by the USEPA and Winrock International organised another Stove Camp in March 2013, aiming at consensus on the dimensions and features of the Chitetezo Mbaula, to work towards standardization and quality assurance of the stove. The National Task Force supports the Malawi Bureau of Standards in the development of national standards for the Chitetezo Mbaula based on the agreement reached during Stove Camp 2013. The PS of Energy, Mr Masanjala graced the open day and encouraged the emerging stove community to increase efforts.

The Global Alliance for Clean Cookstoves provides Malawi with additional international experience that will contribute to developing the national cookstove programme. Following a suggestion by GACC, the US supported a market assessment study carried out by GVEP and independent consultants. It was presented in March 2013[26] and outlines the foundational role of the EnDev-ProBEC programme for the sector development in Malawi.[27]

2. Planned Outcome

Energy Service Segment	Old target	New Target
Energy for Lighting & Electric HH Appliances	0 people	0 people
Cooking Energy for Households	62,500 people	125,000 people
Electricity and/or Cooking Energy for social infrastructure	0 institutions	0 institutions
Energy for productive use/ income generation	0 enterprises	0 enterprises

Each firewood stove sold in the urban areas will not provide 100% access to modern energy, as most urban households also have a charcoal stove, which will not be targeted with this project. Thus each household reached will only be counted by 50%. This means that on the basis of an average 4.4 household members in the urban areas, almost 57,000 stoves will have to be sold to reach 125,000 people. This target will be achieved without further project intervention latest by December 2014.

3. Project Approach

3.1 Energy Technologies and Services Promoted by the EnDev Project

The focus of the upscaling will be on strengthening a sustainable supply of the Chitetezo Mbaula stove and to enhance market penetration in the major urban areas of Malawi.

The Chitetezo Mbaula is a simple stove made of fired ceramic and currently the most affordable and popular portable household-size firewood stove in the country. It can reduce fuel consumption by up to 50%, especially when compared to outside three-stone-fires. As it can also burn other small biomass residues, it can reduce or in some cases even eliminate the need for purchased firewood. The stove has proven to be a suitable technology not only for

[26] http://mbaula.org/events_mwcctf_marketassesment2013.htm
[27] http://mbaula.org/index_htm_files/4%20%20Malawi%20Market%20Assessment%20Sector%20Mapping%20Presentation.pdf page 24

rural but also for urban households. The EnDev-Malawi partner MAEVE, the non- profit wing of Area55 consulting, is the only organisation linking the predominantly rural producers of the Chitetezo Mbaula to the urban markets in Malawi.

The Malawi Cookstove Market Assessment study identifies the urban consumers as an easier segment to penetrate the market due to greater affordability and interest of the target group to reduce expenditure for fuel through the purchase of a stove. The study estimates the market to be around 110,000 stoves among the urban population disposing more than EUR 1 per day and about 300,000 among the less affluent. [28]

The Cookstove Intervention and Mechanisms Roadmap presented by GVEP in March 2013 states clearly that the stoves supply chain in Malawi is weak to non-existent, that the commercialization of cookstoves is at a nascent stage and that new delivery models of stove dissemination are needed. [29] The initial proposal for EnDev Malawi aimed to fill exactly that gap by enhancing stove production and transport capacities and creating outlets and sustainable marketing structures in the urban and peri-urban areas.

The approach taken is purely commercial. The end-user price of the stove will not be subsidised. The aim is to achieve access to a uniform product at equal prices all over the country. Future revenue from verified emission reductions can sustain the mandatory but costly monitoring of stove adoption and usage beyond the availability of EnDev funding. In addition, the income will sustain and expand the interface between small scale rural producers and urban sales outlet chains. Thus, carbon revenue is key for the business beyond the support of EnDev funding and will help fund sustainability of the stove supply and marketing.

3.2 Approach to Provide Clean Cooking Technologies to Households

Since the start of EnDev Malawi in April 2013, implemented by the local NGO MAEVE, the demand created by the awareness campaigns and road shows organised by MAEVE for Chitetezo Mbaula stoves in urban and peri-urban areas of the country had soon surpassed the supply of available quality stoves. Especially in the largest urban agglomeration of the country, Blantyre/Limbe, supply could not keep pace with the sales generated through the first fixed outlets at filling stations, supermarkets etc., even before the start of the major advertising campaign.

The overwhelming response to the awareness campaigns was enhanced by the general momentum for cookstoves created by the President's Initiative for 2 million cookstoves by 2020 earlier in the year. Several cookstove related events in 2013 assisted the public awareness and the readiness of the press and media to report on the previously neglected and forgotten topic. In the first three months MAEVE managed to facilitate the sales of over 4,000 stoves, with a rising tendency. The bottlenecks were temporarily overcome by transporting stoves from the central region to the South, but this is resource-intensive and not sustainable on the long run. EnDev Malawi runs the risk of becoming the victim of its own success. Out of this lesson learnt, the following new interventions are proposed:

Key Intervention 1: Strengthening the supply side

Increase production capacities of most enterprising groups in strategic areas to supply major urban markets

MAEVE has already undertaken major efforts to increase the supply of quality stoves, but it could achieve even bigger results with some added financial support towards production capacities of key players.

What is especially needed is a regular supply of at least 3,000 stoves per month even in the rainy season when production in the rural areas usually slumps. Rural stove producers are not commercial producers but primarily farmers, so in the growing season they are busy on

[28] http://mbaula.org/index_htm_files/4%20%20Malawi%20Market%20Assessment%20Sector%20Mapping%20Presentation.pdf page 34

[29] http://mbaula.org/index_htm_files/7%20-%20Intervention%20Mechanisms.pdf page 3

their fields and have less time to dedicate to stove production. Rural stove production is an off-farm activity that peaks in the dry season, from April to November when farming activities slowdown in rain fed agriculture.

Thus a more commercially oriented full-time stove production is needed to complement the seasonal rural producer groups and ensure supply during the rainy months starting from November. While warehousing can assist to build sufficient stocks, especially for the increased sales before Christmas, it will not be easy to bridge the months up to April/May, when the rural production usually resumes. To ensure consistent supply, a steady production is needed.

This 'base supply' should ideally be close to the major urban demand centres Blantyre, Lilongwe and Mzuzu, in order to minimise transport needs. In total MAEVE wants to support up to 10 producers around these centres with small grants of up to 3,000 EUR each.

Two major stove producers in Lilongwe already indicated strong interest to scale up their production to 1,000 and 1,500 stoves per month. They would need some investment funding to upgrade their production facilities. One has already increased his kiln capacity from 120 to 190 stoves per kiln-load. All producers would need additional sheltered space for production, drying and storage of firewood and stoves and enlarged kiln capacities.

In August 2013 the National Task Force awarded grants to five organisations in the different regions of Malawi to scale-up production of the Chitetezo Mbaula that is emerging as a cost-effective appropriate firewood stove for both rural and urban areas at national level.

MAEVE received one of the grants to build up a production group in the Blantyre suburb of Machinjiri, and another grant was given to the organisation of the former ProBEC national coordinator in Mzuzu, who wants to use MAEVE marketing structures and concentrate his efforts on production. This should boost the supply for that area.

With these additional measures, a steady stove supply throughout the years seems feasible.

Increase decentralised production capacities countrywide to reduce transport needs

Currently the Chipiku supermarket chain orders 500 stoves every two weeks for their outlets in the central region. Negotiations were successful to expand stove marketing to Chipiku outlets country wide. Therefore more decentralised production groups are needed to supply the outlets in all regions directly. MAEVE already trained new production groups in Kasungu, Salima, Blantyre, Chikwawa and Mulanje, but needs to expand and densify the producer network. This can either be done by training new groups or complemented by the following activity.

Offer marketing services to existing producer groups who have difficulties finding markets for their stoves

EnDev-ProBEC assisted over 40 partner organisations in Malawi to train stove producer groups in many parts of the country. In 2008 the annual production was exceeding 10,000 Chitetezo Mbaulas stoves. Yet, the big bottleneck turned out to be weak market linkages: A good stove producer is not necessarily a good stove sales-person. So quite some stove producer groups slowed down or even stopped their production when the immediate market in their surroundings was satisfied and the demand slumped. There is a big potential to revive those production capacities if they can be assisted to extend their market linkages into the urban areas. With the awareness campaigns including billboards and professional road-shows, EnDev-MAEVE has successfully established brand awareness for the Chitetezo Mbaula in the last months. It has also become the key marketer of the brand and the first address for Chitetezo stove producers in Malawi who approach them for assistance to find markets. Rather than taking up responsibility for production groups, MAEVE has decided to use its popularity and focus on its key competences, which is professional marketing and let others focus on production. Thus this upscaling proposal has a larger proportion dedicated to marketing than on fomenting production. There is enough underutilised production capacity

which can be scaled up if the sales can be boosted through awareness creation and marketing.

(Re)train producer groups on quality standards of stoves in line with the dimensions and criteria agreed by the National Task Force

MAEVE wants to enhance quality assurance of the branded product and only market stoves that comply with the new dimensions agreed and supported by the National Task Force. The aim is to have a uniform product of comparable quality, regardless of the point of origin or sale throughout the country.

Quality control tools including paddle moulds as well as laminated posters with the correct dimensions and process description are distributed to producers to ensure the standardisation of the dimensions of the artisanal produced clay stove. MAEVE trains producers on the use and application of the tools and applies rigorous quality control of stoves at all levels.

For the time being MAEVE sends its own monitoring staff with the trucks procured through EnDev funding to buy stoves from the producers groups. Each stove is inspected and the serial number recorded. Non-compliant stoves are rejected and do not enter the marketing chain. This exercise is resource intensive but helpful to enforce quality assurance at production level. Sales agents are also trained and encouraged to enforce further quality controls. The aim is to eliminate sub-standard products to be marketed under EnDev.

This upscaling proposal includes more resources for monitoring staff, travel and transport to assist with this uphill battle.

Support National Task Force in quality assurance and standards developments

MAEVE has become an active member of the National Improved Cookstoves Task Force. In this role it provides its experience and supports the Malawi Bureau of Standards in the process to develop of the first national standards for a cookstoves, to be started with the Chitetezo Mbaula.

Key Intervention 2: facilitate a distribution system

The second set interventions of this upscaling proposal is supposed to facilitate a distribution system to new markets in urban areas by creating outlets and sustainable sales structures for fuel-saving firewood stoves in the major urban and peri-urban areas of Malawi.

Promote and support transportation of stoves to urban areas

The initial proposal foresaw transport support for sales agents with bi/tri-cycles. This idea was abandoned after road-side vending was recently banned by government. Further, tricycles were no longer an economic option after a sharp price increase. 10 bicycles that were already bought will be allocated to enhance transport capacity of production groups for shorter distances. The freed up budget will be used to buy a third truck for the North to complement the two own trucks MAEVE already procured for Blantyre and Lilongwe. This is felt sufficient to support the buying of stoves from producers groups and transport them to warehouses in the three regions, from where they will be sold in bulk to the major retailers. EnDev Malawi further works on connecting transporters with production groups to create additional and independent transport capacity.

What remains is to enhance mobility for the M&E and training team of MAEVE, with three small used vehicles like mini-pick-ups that can transport small numbers of stoves and enable the team to do quality control visits to production groups.

Expand outlet network countrywide in cooperation with key strategic partners like filling stations and supermarket chains etc.

After the legislation has changed and vending is no longer allowed on the roads, MAEVE being part of a government initiative looked for legal permanent outlets. MAEVE targeted key strategic partners with countrywide outlets, but a centralised procurement department. Deals were closed with the Chipiku supermarket chain and PUMA filling stations. Well-designed displays at filling stations proved a good sales tool, helping to sell even over 10 stoves per day. Sales started in the Central and Southern regions. Once sufficient supply capacity is in place to suffice demand, expansion will go country wide and also include a second filling station chain.

Furthermore MAEVE is looking for other retail outlets in all quarters of the major urban areas.

Thus 80 more display stands will be needed for scaling up.

Continue awareness campaign

MAEVE subcontracted the road-show specialist Market-Link for the professional execution of the brand awareness campaign at the grass-roots level. The campaign also includes quizzes, raffle-draws and contains messages and demonstrations about the correct usage of the stoves. During their shows in hotspots of densely populated quarters in Blantyre and Lilongwe they sometimes sold more than 100 stoves per show. Awaiting suitable stove availability, the shows will expand to Mzuzu and other selected district capitals.

MAEVE created wearable branded materials like caps, T-shirts and Chitenjes (traditional cloth), which proved very effective and treasured give-aways at road shows and other events. More branded material will be developed like car-stickers, calendars, exercise books and pens aimed at the young population and many more.

MAEVE managed to recruit the popular Hazel Warren as ‘the face and culinary ambassador’ for the Chitetezo Mbaula. A publication of ‘cooking with Hazel on the Chitetezo Mbaula’ is planned. Her face features prominently on the billboards and the two MAEVE-owned truck, attracting a lot of attention on the roads. Future plans include the branding of minibuses and more billboards to make the product known and people aware of the brand.

MAEVE truck during roadshow in Lilongwe

Billboard at airport-junction in Lilongwe

Strengthen sales outlets with marketing campaign in April-June 2014

Following the awareness campaigns, a marketing campaign is envisaged to remind people to keep on buying the product. The timing is supposed to coincide with the start of the dry season, when rural production will resume and food prices normally go down, so that people might have more disposable income. The aim is to promote the various sales outlets and

make their locations known. The campaign will include professional shows on TV and radio, with some events to celebrate monthly draws with high-value prize to uplift the perception of the Chitetezo Mbaula as a 'modern' energy device. Prizes will be coveted modern devices like mobile phones or electric home-appliances, as well as renewable energy appliances like high-quality solar lanterns to ease the impact of the frequent load-shedding. Most urban areas suffer regular load-shedding on 2-3 days per week, sometimes from morning to 8 p.m., including three hours of darkness.

To incentivise competition among the sales outlets and create more public awareness, the lucky draw will be held every month at different locations, selected according to the performance of the sales outlets. The locations will be announced on the radio and the newspapers, leading to increased publicity.

Market Development study

The urban market for improved firewood stoves is undergoing a rapid development, thanks to EnDev Malawi's intervention. This provides an ideal case to carefully analyse and learn more about market development for future EnDev interventions. EnDev has initiated activities on global level to do more in depth analysis on market development triggered by the programme. An analytic framework has been developed for this purpose. EnDev Malawi will be one of the first projects to apply this framework. This market development study will be carried out by GIZ rather than through MAEVE in the first half of 2014 and is part of this upscaling proposal.

4. Expected Impacts of the Project Intervention

Impact	Possible Indicators
Environment	Reduced overall demand of biomass energy and potentially reduced charcoal demand through partial substitution of charcoal through firewood; indicators: number of stoves sold to households (stove sales records); number of households that indicate potential shift from charcoal to firewood (user survey)
Health	Reduction of smoke and heat exposure; indicators: percentage of households that perceive there has been a reduction in health problems that were caused by the use of fuels in inefficient systems for cooking (user survey)
Poverty/Livelihood	For the users more money available caused by lower expenses for fuel, more income for stove producers and retailers; indicators: savings on monthly fuel expenditure (user survey); stove producers, transporters of stoves and retailers perceive a rise in their income and improvements in their livelihoods (survey)

5. Budget

5.1 GIZ budget

		EUR
1	Human resources and travelling	30,000
2	Equipment and supplies	0
3	Funding financing agreements/local subsidies	200,000[30]
4	Other direct costs	3,242
5	Total direct costs (sub-total)	233,242
6	Mark up costs/administrative overheads/imputed profit	16,758
7	Cost price	250,000

5.2 MAEVE budget

		EUR
1	Human resources and travelling	45,000
2	Equipment and supplies	56,000
3	Other costs: promotion material and campaigns	99,000
4	Total costs	200,000

[30] see 5.2

Mali

Promoted technology	Solar / Biogas (possibly)		
Project period	Old: 01.2013 - 12.2014 New: 01.2013 - 12.2017	**Project budget:**	Old: € 850,000 New: € 3,000,000
Target Groups	Households, social institutions (SI), small and medium sized enterprises (SME) in rural areas		
Lead Political Partner	Malian Ministry of Energy and Water Ministry of Territorial Administration and Local Communities (MATCL)		
Implementing organisation	GIZ		
Implementing partner	Rural Electrification Agency (AMADER), NGOs		
Involved bilateral / multilateral programmes	SNV		
Summary of Key Interventions and Outputs	• Facilitation of distribution of pico PV • Set-up and hybridisation of minigrids		

Target (number of beneficiaries)	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	19,800	100,000	people
Cooking energy for households	0	0	people
Electricity and/or cooking energy for social infrastructure	180	180	institutions
Energy for productive use/ income generation	0	50	SMEs
Project Manager	Name: Dirk Betke, email: Dirk.Betke@giz.de		

1. Situation Analysis

With a EUR 900 per capita annual GDP Mali still is a very poor country, ranking 214 out of 228 countries worldwide. In 2010, 61% of its 16 million population lived below the USD 2 per day poverty line (down from 72% in 2005), 37 % below the EUR 1.25 per day poverty line.

Despite a relatively stable democracy, an influx from Tuareg militia in the aftermath of the 2011 Libya events exacerbated tensions in northern Mali, sparking a rebellion in January 2012. Initially subdued, the Malian army, frustrated with the poor handling of the rebellion, staged a coup in March 2012. The resulting lawlessness and the effective lack of army-control subsequently re-sparked the northern rebellion in which Tuareg fighters were then joined by Islamic fundamentalist factions, together quickly gaining control over all of northern Mali. When eventually pressing further, and threatening to take the city of Mopti in January 2013, French and Chadian troops came in and retook most of the north. By mid-2013 they were replaced by AU troops under a UN mandate. Politically, following the March 2012 coup, ECOWAS mediation led to a return to a civilian interim administration in April 2012, with the objective to prepare a return to democracy. This culminated in the July 2013 elections that passed in good order and which saw Ibrahim Boubacar Keita elected as president.

The Tuareg rebellion and subsequent events effectively caused a 'hibernation' of most development programmes, including GIZ's rural electrification programme ELCOM.

The orderly July 2013 elections and the stabilising of the north by AU forces under UN mandate give confidence that a proposal for up-scaling of that programme, originally foreseen for late 2012 but postponed due to the circumstances can, and should, now be submitted.

1.1 Energy Situation

Primary Energy supply

Like many African countries, the national energy situation is characterised by an overexploitation of forest-resources. Biomass, mainly in the form of wood and charcoal for domestic use, plays the dominant role in the Malian energy balance accounting for 78% of the annual primary energy supply,

Despite substantial oil (and uranium) reserves in the north of the country, fossil fuel provision play only a minor role till today, accounting for 18 % of the primary supply. Mali fully depends on importation of oil; cost of this supply corresponds to 16 % of the national budget, increasing by $1/10^{th}$ annually.

The remaining 4% of the primary energy supply is largely made up of renewably generated electricity, mainly by hydropower.

Electricity provision

An estimated 20% of the imported fuel is used for grid based electricity generation. The capacity of the installed thermal plants is approximately 170 MW, representing roughly half the total generation capacity. The other half consists of hydropower.

Total annual electricity generation is 500-700 GWh. This electricity is mainly used for electrification of urban and peri-urban areas. Grid extension into rural areas is very limited and the country is just too poor and with over 1.2 million km^2 too big and too sparsely populated (13 people/km^2) to expect such extension to happen at any meaningful scale in the coming years. Thus, rural electrification is mainly based on mini-grids or individual systems.

With 35% of its population living in urban areas (out of them one third in Bamako), national electrification rate is estimated at 28%, 59% in urban areas and 12% in rural areas (the latter figure presently even quoted at over 15%). The reported figure for rural electrification thereby has risen sharply from 2% a decade ago; however, quantity, quality, reliability and affordability of this rural access often are questionable.

All in all, the challenge to provide Mali's over 700 rural communes / 11,000 villages / 10 million people living in rural areas with adequate access to electricity remains enormous, requiring strong additional efforts by all actors involved.

Renewable Energy Potential

Whilst current primary energy supply is largely based on either (non-renewable) use of biomass or on imported fossil fuels, the countries' potential for renewables is very large:

- Solar irradiation is well distributed over the territory and at 5-7 kWh/m^2/day is relatively high, while there's plenty of space to make use of this irradiation;
- Significant wind energy potential is available, particularly in the Sahel and Saharan zones, where annual average wind speed is estimated at 3 to 7 m/s.
- The potential for large hydroelectric sites (>10 MW) is estimated at 1,150 MW, all of which along the rivers Niger and Senegal, of which about 250 MW is presently developed, and partly shared with Senegal and Mauritania. Apart from that, various sites provide options for mini- or micro-hydro plants.
- Biomass/biofuels/biogas: whilst presently most biomass use is non-sustainable, Mali's large agricultural base offers various possibilities for renewable energy production, in the form of biomass, biogas and biofuels (alcohol, plant oil).

At present, still only a small fraction of Mali's renewable power generating potential is exploited. In recent years, the necessity of tapping these resources was clearly identified, and also national agencies are now steering towards provision of renewables based rural electrification, a direction already adopted by intervening NGO's earlier on.

1.2 Policy Framework, Laws and Regulations

Malian energy policy aims at contributing to a sustainable development of the country by making energy services available to as many as possible, thereby favouring (promotion of) social-economic activities. There are four specific objectives:

- Satisfy the energy needs of the country in terms of quality and quantity at modest cost;
- Ensure protection of people, goods and the environment against risks inherent to energy services;
- Strengthen the energy sector's capacity in terms of management, control and strategic planning;
- Strengthen international cooperation regarding the energy sector.

These policies are not yet sufficiently developed and implemented to respond adequately to the rising demand for electricity.

The large number of ministries, services and other actors somehow involved in the energy sector (see below) imply that the amount of legal texts and regulations is also considerable.

1.3 Institutional Set-Up

Four ministries are involved in the energy sector: OPM, MEE (Ministère d'Énergie et de l'Eau), MEF (Ministère d'Économie et de Finance), MEA (Ministère d'environnement et d'Assainissement); three directorates: DNE (Direction National d'Énergie), DNGM (Direction National de Géologie et des Mines), DNCN(Direction National de Conservation de Nature); one research institute liaised to the DNE: CNESOLER (Centre National énergie solaire et d'énergie renouvelable); five privatised services: ONAP (Office National des Produits Pétroliers), AMARAP (Agence Malienne de Radio Protection), AMADER (Agence Malienne pour le Développement de l'Energie Domestique et de l'Electrification Rural), AUREP (Autorité pour la Promotion de la Recherche Pétrolier), ANADEB (Agence National de Biocarburant) and a regulatory body for electricity and drinking water (CREE).The large spread of institutions involved in the sector stands out, as well as the fairly recent creation of some technical services (AMARAP, AMADER, AUREP, ANADEB).

Grid based electricity provision is mainly by the national utility EDM-SA(Energie du Mali) and further by some private operators like SSD(Société de service décentralisée). Of the above, DNE, AMADER, CNESOLER and ANADEB are likely to be the most relevant in relation to (renewable) energy for electricity generation in rural areas. Operational responsibility for rural electrification rests with AMADER; their rural electrification strategy focuses on the creation of a private sector in which public / private partnerships on a local level should take a lead role in the rural electrification process, with the objective to achieve 55% rural electrification by 2015. This gargantuan task reasonably overstretches AMADERs capacity; the agency has neither the capacity nor the resources to achieve such objective. Moreover, primarily judging proposals of private operators and subsidising them from WB funds, AMADER so far hardly played a role in creating a sector, in interlinking electricity provision with decentralisation politics or in involving local municipalities in the process, which however would be crucial for ensuring sustainability. Recently an additional USD 50 million funding by the World Bank under the Scaling up Renewable Energy Programme (SREP) ensured AMADER's continuity for the coming years; as stated above, a large share of this funding will serve to convert diesel-powered mini-grids to solar-diesel hybrid operation.

The National Centre for Solar and Renewable Energy (CNESOLER) is a research centre under the DNE at which mainly solar powered renewable technologies are tested.

The National Agency for Biofuels ANADEB was erected in 2008 during the Jatropha hype and promotes the interests of operators in the biofuel sector, of which some 40 are listed though only a handful has any meaningful acreage.

1.4 Major Donor Activities

Key donors in relation to rural energy provision include the World Bank, Germany (through KfW) and DGIS. Activities in Mali are implemented by the above listed services of the Ministry of Energy and Water, in cooperation with NGOs and the private sector, and under various programmes like PRODER (Programme d'electrification rurale), PEDASB (Projet Energie Domestique & Accès aux Services de Base en Milieu Rural), PASE (Projet d'Assistance au Secteur Electrique), SREP (Programme de valorisation à grande échelle des énergies renouvelables), ELCOM (Electrification Communal) and DOF

1.5 Lessons learnt from previous or ongoing projects

Rural electrification so far result from interventions by (I)NGOs, (social) enterprises, and the WB funded programmes of the rural electrification agency AMADER. Looking back, lessons can be learned from these interventions, rendering suggested future (GIZ) interventions more effective.

GIZ / ELCOM: The electrification component linked to GIZ's communal support programme PACT consisted of setting up PV-powered communal Battery Charging Stations (BCS) while simultaneously providing social infrastructure with individual PV systems. As documented elsewhere, the adopted management structure was not always successful, implying BCS revenues often are insufficient to cover replacement of equipment, requiring adaptations in the coming years.

Recently another trend showed: with strongly declining prices of PV panels in the last years, such panels now cost roughly the same as the matching battery. Consequently, households that previously could afford a battery now can similarly afford a matching panel, thus creating their own individual system and leaving the BCSs unused. While confirmation is required, the (preliminary) conclusion is that the concept of battery charging stations has little or no future. Existing BCSs should then be either abandoned or converted into other functions and future interventions should follow another approach.

In further analysing current activities, two elements appear successful and can be retained / continued:

1) In an attempt to generate more income from BCSs, sale of good quality pico PV devices through BCSs started last January in cooperation with the NGO "NOTS". This proved successful, meeting a clear demand for such devices and solving the last mile distribution constraints in areas concerned (i.e. while the demand is generally there, logistic costs for going to a remote village in order to sell just a few products outweigh the profit; being able to keep a stock at a secure place like the BCSs solves this issue).

2) Also in attempting to revitalise the BCSs, a hire-purchase system for solar batteries was set-up in collaboration with the micro finance institution "Kamek", in which a financial guarantee, provided by SNV, resulted in acceptable interest rates. Such mechanism could serve well in potential future distribution of small individual systems (large pico PV, small SHS).

As part of the second EnDev phase installation of one mini-grid was foreseen that still isn't completed due to last year's events. In finalising the design, the business plan and the eventual installation and probably expansion of this mini-grid, recent insights will be incorporated.

AMADER: AMADER's approach in recent years consisted among others of an up to 80% subsidising of local initiatives for local electrification through mini-grids. This resulted in some

60 operators running 248 mini-grids across the country, nearly all diesel powered. Operating costs for diesel powered mini-grids are high; with diesel prices around EUR 1 per litre, fuel costs amount to EUR 0.30 per kWh. For profitable operation tariffs of EUR 0.60 per kWh or more are required. Such tariffs compare unfavourably to those of around EUR 0.20 per kWh of the national utility EDM that runs hydropower plants and furthermore benefits from highly subsidised fuel. In attempting to keep the balance, AMADER, responsible for setting tariffs in rural areas, so far does not allow tariffs over approximately EUR 0.30 per kWh. Consequently many of these mini-grids are loss-making and/or are not operational. This has been recognised and with recent additional WB funding under the SREP programme, 130 of these mini-grids will be converted to PV-diesel hybrid operation in the coming years.

Simulations indeed show that a cost optimum is achieved for hybrid systems with roughly 80% PV and 20% diesel. However this will not solve the tariff issue entirely; generally higher tariffs than currently allowed are required for profitable operation of any mini-grid.

At the same time it should be recognised that at EUR 1 / litre, diesel prices in Mali are considerably lower than those in neighbouring Senegal or Burkina Faso (around EUR 1.25), in the broader context sparking the discussion to increase diesel costs.

YEELEN KURA: This social enterprise and offspring of the Foundation for Rural Energy Services, has been active in rural electrification in Mali for over a decade, initially by installing SHS on a fee for service basis, since a few years also by installing solar-diesel hybrid mini-grids, of which they now operate eight in total. With the first of these in service since 2008 in the 5,000 people village of Kimparana, Yeelen Kura at present is the only company in Mali that has some longer term experience with solar diesel hybrid mini-grids. The above addressed tariff issue at present also holds for YEELEN KURA. Another relevant issue is that of productive use. Consumption of electricity for consumptive purposes is often not sufficient to ensure sufficient income for the operator. In this respect a thorough basis of productive use in villages where a mini-grid is erected, is required.

MBC / MFC: The social enterprise Mali Biocarburant (MBC) and the NGO Mali Folke Centre (MFC), as well as others, explored the possibilities of Jatropha curcas as a crop for production of biofuel. While overall results fall far behind initial expectations and many projects gave up, MBC and MFC each set up projects aiming to digest the Jatropha presscake and feed the resulting biogas to diesel engines / generators, thus replacing part of the diesel consumption by biogas. MFC is constructing a larger biogas plant for the mini-grid of Garalo and intends to convert another dozen diesel powered mini-grids of AMADERs programme to simultaneously run on biogas and diesel. MBC converted a series of multifunctional platforms to run on biogas / diesel, initial results of which are promising, showing a reduction in diesel consumption of up to 70%.

2. Planned Outcome

Energy Service Segment	Old target	New Target
Energy for Lighting & Electric HH Appliances	19,800 people	100,000 people
Cooking Energy for Households	0 people	0 people
Electricity and/or Cooking Energy for social infrastructure	180 institutions	180 institutions
Energy for productive use/ income generation	0 enterprises	50 enterprises

The steep increase in planned outcome for household electrification is largely due to the projected sales of pico PV devices (+75,000); these constitute tier 1 connections; the remainder (+5,000) relates to (tier 3) mini-grid connections. This outcome furthermore is based on an average Malian rural household size of ten people.

The additional enterprises relate to the diversification of payable services at the current BCSs (see below); in addition in the mini-grid villages some enterprises will be electrified.

3. Project Approach

3.1 Energy Technologies and Services Promoted by the EnDev Project

From the problem description and the resulting lessons and opportunities, the following activities are proposed for the coming four years.

1) Considering that existing BCSs as a result of declining PV panel prices will eventually lose their function, it is proposed to convert these 50 BCSs into energy-kiosks, where pico PV devices, but also bulbs, (rechargeable) batteries etc. are sold. As long as demand for battery charging remains, this service will be met, while excess PV capacity will be used to provide services that are not covered at household level (i.e. exceeding regular SHS capacity). Cooling / freezing capacity, either for consumption (cold drinks) or for storage of e.g. milk, fish, meat, would be a typical example. Alternatively, excess electricity can power small productive use like sewing, hairdressing and cell phone charging. While such additional activity will increase revenues, the management model of the kiosks also still needs addressing, in order to yield a (financially) sustainable operation.

2) Further to the above and considering the last mile distribution issue, it is proposed to extent facilitation of pico PV distribution, again in cooperation with NOTS, to other regions where GIZ is presently active in Mali. In this cooperation NOTS is responsible for import and initial distribution of good quality pico PV products. GIZ activities will subsequently consist of awareness raising (both for the benefits of PV, as well as for differences in quality and performance of different products), identifying potential sales points (preferably private structures), strengthening capacities where required, and serving as a go-between and guarantor if required.

In addition to the 17 ELCOM municipalities, another 18 rural communities are identified where current GIZ activities and structures offer ample possibility to promote and facilitate distribution of pico PV. While in some cases private entrepreneurs will be approached and assisted in setting up such distribution, diffusion will also be promoted in collaboration with fish farmers' associations, women's groups, organisers of annual fairs etc. Furthermore, and considering that at present more over 60% of the Malian population has a mobile phone, that needs charging on the one hand and prepaid credit on the other hand, the possibility to sell and distribute Pico PV devices through e.g. phone card vendors will be studied – to which end contact with mobile phone operators will be made.

3) The upper end of the pico PV range consists of small, plug and play SHS (typically 2-4 lamps and possibilities to charge some small appliances) at prices of up to USD 200. Target group beneficiaries cannot normally afford such expenses directly. As there is a clear demand for such systems, it is proposed to again provide a guarantee to an MFI in order to facilitate a hire-purchase system for upper end pico PV at reasonable interest rates.

4) In the coming months, the single mini-grid foreseen under the 2nd phase of ELCOM will be installed. However it is already clear that in order to eventually serve the entire village, additional generation capacity will be required and it is proposed to take up a provision for such additional capacity. The exact additional capacity or even the technology of thereof is not certain yet and will be based on further studies and exchanges with other operators (like YEELEN KURA, MBC, MFC). Simultaneously the business-case for the mini-grid will be further elaborated. The key-parameter herein is the electricity tariff, which will be calculated such that with current knowledge, a profitable and thus financially sustainable operation of

the grid is ensured. However, application of such tariff then still needs to be endorsed by AMADER before it can indeed be applied.

5) If the concept tested under activity 4 is successful, and particularly if a financially sustainable operation with the set tariffs is possible, it is planned to convert another tranche of presently diesel powered mini-grids to hybrid operation, be it by adding solar power or by adding a biogas component. Selection criteria would include size, positioning in relation to GIZ intervention zones, operating model, ample productive use, etc. For stimulation of productive use where required, cooperation with SNV will be established.

4. Expected Impacts of the Project Intervention

Impact	Possible Indicators
Environment	Limited; electrification as foreseen firstly serves the populations lighting needs and provides some additional energy services. Actual environmental impact and indicators therefore are limited. At best on the one hand kerosene smoke will be avoided while on the other hand proper recycling of e.g. batteries should be taken care of.
Health	Replacing kerosene lamps by electric light will generally benefit health, for which in particular the occurrence of URTI / LRTI could be an indicator.
Poverty/Livelihood	Benefits of pico PV are good and safe light as well as potentially better communication. In addition the cost for lighting will eventually go down. These aspects all contribute to poverty alleviation, however clear indicators are hard to define.
Education	The installation of mini-grids will boost productive use in villages, leading to economic growth that can be measured by the turnover of the productive use customers.
Governance	Electrification of schools will widen the possibilities for good education; good lighting at home facilitates studying. Both effects should lead to better performing pupils, which can be measured by their grades.

5. Budget

		EUR
1	Human resources and travelling	1,118,510
2	Equipment and supplies	426,240
3	Funding financing agreements/local subsidies	50,000
4	Other direct costs	227,936
5	Total direct costs (sub-total)	1,822,686
6	Mark up costs/administrative overheads/imputed profit	327,324
7	Cost price	2,150,000

Rwanda

Promoted technology	MHP / Pico PV systems		
Project period	Old: 10.2009 – 12.2014 New: 10.2009 – 12.2017	**Project budget:**	Old: EUR 12,490,000 New: EUR 15,490,000
Target Groups	Rural / peri-urban poor		
Lead Political Partner	Ministry of Infrastructure (MININFRA)		
Implementing organisation	GIZ		
Implementing partner	Energy, Water and Sanitation Authority (EWSA)		
Involved bilateral / multilateral programmes			
Summary of Key Interventions and Outputs	9 micro hydro power plants will be developed in rural areas by Rwandese private companies, providing electricity to 89,640 people. Sites with existing feasibility studies will be selected through a competitive tender procedure. Successful companies will receive financial, technical and management assistance by EWSA with EnDev/PSP Hydro providing additional backstopping.		

Target (number of beneficiaries)	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	918,450	1,008,090	people
Cooking energy for households	20,544	20,544	people
Electricity and/or cooking energy for social infrastructure	5	0	institutions
Energy for productive use/ income generation	30	0	SMEs
Project Manager	Name: Benjamin Attigah, email: benjamin.attigah@giz.de		

1. Situation Analysis

1.1 Energy Situation

Energy consumption in Rwanda is very low, with 85% coming from biomass, only 11% from petroleum and 4% from electricity. The country has by far one of the lowest per capita electricity consumption rates in the world: Rwanda consumes about 42 kWh/year/capita compared with 478 kWh in sub-Saharan Africa and 1,200 kWh for developing countries as a whole. Electricity access is still very low, and mostly limited to urban and peri-urban areas. Most of the households depend on kerosene and candles for lighting. This form of lighting is not only very inefficient and expensive; it is also the source of health risks and carbon dioxide emissions.

The Electricity Access Roll-Out Programme (EARP) implemented by the Energy Water and Sanitation Authority (EWSA) is the Government's main tool to achieve the ambitious electricity connection targets. The EARP has been highly successful, increasing the number of customers connected to the system from about 187,000 in December 2010 to about 360,000 by June 2013.[31] As a result, grid connection rate has increased from 8% to 16% (in October 2012), with a 2% connection rate in rural areas.

[31] EWSA, Baseline Performance contracts, 2013-2014

At the same time, Rwanda is experiencing severe shortages of electricity supply, with only 110.8 MW of installed capacity. Rwanda relies mostly on hydropower and thermal plants for its electricity generation. Due to electricity shortages in the mid-2000s, the GoR installed 37.8 MW of thermal plants, which led to an increase in tariffs to about USD 0.21/kWh, the highest tariff in the region. The limited generation capacity leads to power outages, and severely constrains the development of strategic economic sectors, as well as the provision of electricity to new customers.

At the same time, the overall potential of hydropower is estimated at about 500 MW, but until the end of 2012 the utilized hydro capacity was only 64.5 MW (AfDB 2012). Rwanda's Hydropower Atlas shows 333 potential sites for small hydro power plants with a capacity between 50 kW and 1 MW each and total potential of 96 MW that could be tapped to achieve electricity access in the rural areas. While at the start of the PSP Hydro programme, there was zero interest from the private sector in investing in micro-hydro power plants, now more and more investors are contacting EWSA to request sites for development (by July 2013, EWSA had received official applications for additional 12 hydro private projects, all developed outside of the PSP Hydro project).

EWSA is currently in the process of finalising feasibility studies for 69 micro hydro sites, developed by international consulting firms (Fichtner, Studio Galli). The government intends to tender these sites out to the private sector for construction and operation. Nevertheless, given the current feed-in tariffs and high investments costs, there still remains a "viability gap" that does not give (local and international) investors the margins required to develop these sites without a limited subsidy.

1.2 Policy Framework, Laws and Regulations

Energy sector development is a priority of the Government of Rwanda (GoR). The Government is currently pushing energy as a key strategic sector, as a precondition for the development of the national economy. The Government of Rwanda has set itself ambitious targets to increase the share of the population with electricity access, as well as for increasing electricity generation. The new Economic Development and Poverty Reduction Strategy (EDPRS 2, 2013) defines the targets for the energy sector:

- Increase electricity generation capacity to 563 MW, leveraging large-scale private sector investment
- Use public finance to de-risk electricity generation projects for the private sector and thereby attract a wider range of investors on better terms.
- Connect 100% of the population through on-grid and off-grid solutions. Approximately 48% of the total population will be within feasible range of the grid. For the remaining households (over 1.2 million), off-grid solutions represent an attractive cost-effective option.

To realize this vision, and to quickly scale up the capacity of the energy sector, GoR gives high level support for private sector delivery, by strongly reducing corruption, ambitious plans for economic development and setting up a one-stop shop for private investors (at Rwanda Development Board and the Investment Unit at EWSA). The new Energy Sector Strategic Plan (2013-2017) reaffirms the need to encourage private sector participation in all phases of the project lifecycle, including design, build, finance, maintain and operate.

The energy sector is changing rapidly, and is becoming more transparent and professionally organised; most of the regulatory conditions are clear now, including the process of applying for private investments in public services. The regulatory conditions for private electricity generation have been established in the Electricity Law. Partly due to the requests by private companies (mainly those supported by PSP Hydro), formalised processes are now in place for environmental impact assessments, independent power producer contracts (IPP), power purchasing agreements (PPA), as well as licensing procedures. The different institutions involved (EWSA, Ministry of Infrastructure, Rwanda Development Board, and Rwanda Utilities

Regulation Authority) have adopted a joint investment process that outlines roles and responsibilities of the involved stakeholders, as well as timelines for the different steps. EWSA has reconfirmed its intention to promote especially the Rwandan private sector, as an important instrument to ensure long-term sustainability in electricity generation and operation.

1.3 Institutional Set-up in the Energy Sector

Public sector

The Ministry of Infrastructure (MININFRA) has the primary responsibility for setting the overall policy and strategy of the energy sector, and for coordinating the development of the electricity sub-sector. MININFRA is the lead authority responsible for development of renewable energy, although the Ministry of Local Government (MINALOC) and local government structures must be also involved in their future development.

The national utility, Energy Water and Sanitation Authority (EWSA), is responsible for generation, bulk transmission and distribution and retailing functions on a commercial basis. Some new large generation projects are planned for development by the private sector that would sell to the utility under power purchase agreements. Within EWSA, in 2012 an Energy Investment Unit was established to implement the Government's strategy of increased private sector participation. This unit serves as an energy investments reference centre for private investors, and will now accompany the investment process over all stages.

Rwanda Utilities Regulatory Agency (RURA) is in charge of determining the feed-in tariffs, and setting licensing procedures.

The environmental aspects of the energy sector are placed under the Rwanda Environment Management Authority (REMA), which functions under the guidance of Ministry of Environment and Lands (MINIRENA), and is responsible for the co-ordination and implementation of legislation and policies relating to the environmental impacts of energy production and consumption.

Private sector

As a result of the PSP Hydro programme, a nascent private hydro power sector exists in Rwanda. Under this programme, three companies have constructed micro hydro power plants (MHPPs) (with capacities of 96kW, 500kW, 438 kW), and three more companies are in different stages of project development. Several companies have contacted PSP Hydro to identify suitable sites.

PSP Hydro currently supports six MHPPs by five private utilities (Murunda, Mazimeru, Musarara, Kavumu, Maruruma, Mashyiga). These developers demonstrated that local companies are indeed capable of evolving into electricity suppliers, but this takes (i) a supportive regulatory framework; (ii) substantial technical assistance to provide just in time assistance, particularly for business development skills; and (iii) time. When the developers started, the regulatory framework was not in place, although this was developed over time. In the first tender stage, three private MHP projects were supported, which represent the first three privately operated plants in Rwanda (Murunda, Mazimeru, Musarara), with a combined capacity of more than 1 MW. As part of the second tender stage, three more projects are scheduled to start construction soon, with a combined capacity of 1 MW (Kavumu, Maruruma, Mashyiga).

In addition, the project developers initially supported by PSP Hydro now have the capacity to develop new MHP projects independently and with their own resources. These projects will add another 5-10 MW to the national grid in the near future (planned for early 2015). ENNy plans to work on Maruruma (340 kW) and has obtained the MoU from MININFRA. SOGEMR is moving ahead with a larger site, Nyundo (ex Mukungwa 4 MW), and is contemplating the upgrading of Musarara. In addition, former employees of SOGEMR have formed their own company (DC Hydropower) and they are in the process of obtaining a MoU for a 2 MW hydro

plant on the Mukungwa river. REPRO is applying for a MoU for a MHP project together with an Indian investor.

Moreover, the Government is now planning to privatise all publicly funded micro hydro plants in the country which fail proper management. Following a request of MININFRA, PSP Hydro carried out a technical and financial audit of the first five pilot plants to be privatised which was officially confirmed at a validation workshop in December 2011. Recently PSP Hydro supported EWSA's Energy Investment Unit and MININFRA in tendering out 4 of these MHPPs to IPPs under a 25 year concession agreement; the tender process was launched in May 2013.

1.4 Major Donor Activities

The PSP Hydro approach was completely new when introduced by the Dutch Embassy/GTZ in 2005, as private companies had previously not been involved in the generation of micro-hydro power. Several other donor organisations are currently engaged in the energy sector; in the area of hydro power, mainly the Belgian Development Agency (BTC) and the European Union were active. In addition, the Electricity Access Roll-out Programme (EARP) is contributing to the fast extension of the grid.

European Union: Mini-hydro component (delegated cooperation with BTC) with a 2 MW plant at Rukarara-II (Nyamagabe district), to be completed by end 2013; Studies for the Ruzizi III hydropower plant evaluation line and transmission line to Rwanda, including distribution post, dispatching centre and cascade coordination.

BTC: Completed construction of micro-hydro plants Nkora; Keya and Cyimbili (combined 3.2 MW), on-going construction of the micro hydro plant of Rukarara II (2 MW) financed jointly with the European Commission and the GoR. Rukarara II has faced significant delays, while the Keya plant has stopped operation due to technical issues. These plants are presently operated by EWSA but EWSA plans to start the privatisation process soon to hand their management to the private sector. BTC is also financing a study on the design of smart subsidies for increased private sector participation in the micro hydro sector.

World Bank: Supports the sustainable development of micro hydro resources through its ESME programme. The project gives support to private micro hydro power developers in Rwanda through technical and financial assistance. The project was designed as a follow-up project to the PSP Hydro project; the main difference is that ESME supports unsolicited proposals, in contrast to PSP Hydro which works only through competitive tenders. The project started in 2010 and is implemented by GVEP under EWSA.

PSP Hydro has collaborated with ESME/GVEP in providing technical support to project developers and in discussions with Government stakeholders. This included joint support to the projects of Calimax (Gasumo, Rubagabaga), as well as continuous dialogue and collaboration to promote private sector participation in the energy sector. Currently ESME supports four private hydro projects. As the project is scheduled to end in 2014, support to new projects will soon be limited to the financing of feasibility studies. It is therefore proposed to continue the usual dialogue and collaboration, rather than take on new joint projects.

Electricity Access Roll-out Programme: Financed by World Bank (USD 75 million), Netherlands (EUR 30 million), BTC (EUR 17 million), AFD (EUR 2.9 million). The EARP is the main tool of the Government of Rwanda to achieve the electrification target of 48% of households on the grid by 2017, as stated in the second Economic Development and Poverty Reduction Strategy (EDPRS 2, 2013-2017). It currently adds about 100,000 household connections every year.

2. Planned Outcome

Energy Service Segment	Old target	New Target
Energy for Lighting & Electric HH Appliances	916,450 people	1,008,090 people
Cooking Energy for Households	20,544 people	20,544 people
Electricity and/or Cooking Energy for social infrastructure	5 Institutions (biogas)	0 institutions
Energy for productive use/ income generation	30 enterprises	0 enterprises

3. Project Approach

3.1 Energy Technologies and Services Promoted by the EnDev Project

The Private Sector Participation in Micro Hydro Power (PSP Hydro) project supports the development of micro-hydro power plants between 100 kW and 500 kW that are constructed and operated by the private sector. These plants are built in remote areas in Rwanda. While in the beginning of the project some plants were planned as off-grid plants, due to the quick roll-out of the grid in Rwanda, as well as the need to bring more capacity on the grid, all plants so far have been connected to the grid.

EWSA strongly welcomes the PSP upscaling approach outlined below. EWSA especially appreciates the experiences of PSP Hydro which managed to provide examples of successful capacity development of local private companies, which are now able to develop and manage MHPPs on their own. EWSA expects to quickly achieve scale with the planned extension of the programme; the EWSA DG underlined that this project is fully in line with the strategy of the Government and EWSA, and that the PSP approach focussing on development of MHPPs through local companies is considered a priority. The PSP Hydro project could therefore make a significant contribution to reaching the goals of the Economic Development and Poverty Reduction Strategy (EDPRS 2), and support Rwanda's efforts in providing reliable and affordable electricity to households.

3.2 Approach to Provide Electricity to Households

Rationale and approach

The PSP Hydro project aims at developing a private hydro-power sector in Rwanda by supporting private development of micro-hydropower (MHPs) plants and by consolidating the participation of private MHP developers in the energy sector. PSP Hydro develops the capacity of Rwandan small and medium-sized enterprises through technical and business assistance, as well as provision of limited co-financing (just enough subsidy on the investment cost to make projects viable, i.e. viability gap funding). Furthermore, the project gives support to Rwandan national institutions in developing conductive policy and regulatory frameworks, and it cooperates with other donor institutions in supporting sector consolidation. The project has also supported MININFRA and EWSA in the privatisation of publicly funded MHP plants.

Under PSP Hydro Phase 1 and 2, projects were selected through two phases of competitive tenders launched by MININFRA; the budget for each tender phase was EUR 2-3 Million. The PSP Hydro project is currently scheduled to end by December 2014. Given the opportunity of 69 feasibility studies for micro-hydro sites, MININFRA and EWSA have approached EnDev

Rwanda about the possibility to upscale the PSP approach and develop a number of these sites.

Changes to the approach for a new phase

As the sector has started to mature and new stakeholders are working on private sector participation in the micro-hydro sector, it is proposed to take the approach to the next level, and to build much more on the structures and institutions in Rwanda. MININFRA and EWSA are interested in using the PSP approach to develop the available sites. This would mean that as in previous PSP Hydro phases, sites will be developed through private sector companies, selected through a competitive tender procedure. But instead of project developers proposing their own sites and then developing the necessary (pre-)feasibility studies, which takes a considerable amount of time, it is proposed to build on the on-going work of the 69 micro-hydro power plant project of EWSA.

Under this project, feasibility studies are already being developed by two international engineering firms contracted by EWSA. These feasibility studies can be used to invite investors to bid for these specific sites through a competitive tender. This will significantly shorten the time needed to complete the projects. In the long-run, MININFRA and EWSA plan to establish a pool for feasibility studies: EWSA will then reclaim the cost for the studies from the private investors who use them, and this money will be used to finance more feasibility studies (one possible mechanism for this would be the planned 'Energy Fund' which is proposed in the new Energy Sector Strategic Plan; however this fund still needs to be set up).

As a first step, EWSA, in collaboration with MININFRA, has pre-selected a number of sites for development. The (draft) feasibility studies for these sites have been used to analyse the comparative potential and associated cost of these sites (see table 1 further below). Out of these sites, the most attractive ones have been chosen, based on capacity, accessibility, distance to grid, as well as financial attractiveness. Sites to be developed will be on-grid; this will facilitate obtaining commercial financing, and will allow a more efficient evacuation of the produced electricity, thus enhancing the financial viability of these projects.

The estimated cost to develop these sites has been calculated based on the draft feasibility studies (see table 1). Nevertheless, even though feasibility studies are available for these sites, it is proposed to allow for flexibility in the approach. This is because the final cost of developing these sites will only be established during the bidding process, when companies propose a revised cost, as well as the subsidy they would require to make the project viable. This means the final costs could be lower, based on the fact that the bidding process introduces competition between the private companies. In addition, it has to be considered that the cost for site development estimated by Fichtner had to be based on standard values and cannot take into account all site and country specific costs. Rwandan companies might also receive lower quotations locally. Furthermore, some of the sites proposed by Fichtner as stand-alone should rather be developed as a "package" in cascade, due to their location and potential for economies of scale (e.g. Mbirumbe); this would also reduce the development cost. At the same time, a comparison of the cost estimated by Fichtner for the bigger sites (Kilimbi, Nyirantaruko, Nyirahindwe) with comparable hydro projects in Rwanda showed that the cost for these larger plants is extremely low. Therefore it is a possibility that during the tender these plants might turn out to be more expensive than estimated in the feasibility studies.

Final costs will also vary based on differences in the financial parameters. That is, loan conditions or equity contributions might differ, and there are currently discussions on an adjustment of the feed-in tariffs by the regulator. If the regulator would increase the feed-in prices that are currently not sufficient to make projects viable, the subsidy granted per project would need to decrease. Therefore, the presented subsidy amount, while based on sound studies, should still be considered indicative. Once market prices will be established as part of the competitive bidding process, the final amount of subsidy will need to be adjusted accordingly.

On an institutional level, EWSA would also take on a much bigger role in facilitating the work of developers. As a major change in approach compared to the first phases, project implementation would be done through EWSA's Energy Investment Unit. This unit has been established in 2012 as a one-stop-shop for private investors. Before, no structure existed within the EWSA or MININFRA that was responsible for private investors. The EIU is in charge of handling the investment process for private investors from first contact with companies and provision of information, through to technical evaluation of proposals and granting documents and negotiating feed-in tariffs. The team consists of three EWSA national counterparts and one senior international expert financed under the Strategic Capacity Building Initiative (SCBI) managed and coordinated by the National Capacity Building Secretariat (NSCBS). In addition, the EIU is supported in technical matters by engineers from the unit in charge of the development of the 69 micro-hydro power plants. The team has handled tender processes for several energy sub-sectors (peat, methane, solar, hydro), and is frequently receiving private investors. Nevertheless, in the micro-hydro sector the team has currently more of a "gatekeeper" function, i.e. making sure all requirements are met, rather than actively providing technical support to private developers (in questions of business plan development and/or appropriate financial, legal, organisational and managerial set-up). If EWSA's EIU should take on these functions, this might require some support in these areas, including introduction in the use of the different PSP Hydro investment assessment tools.

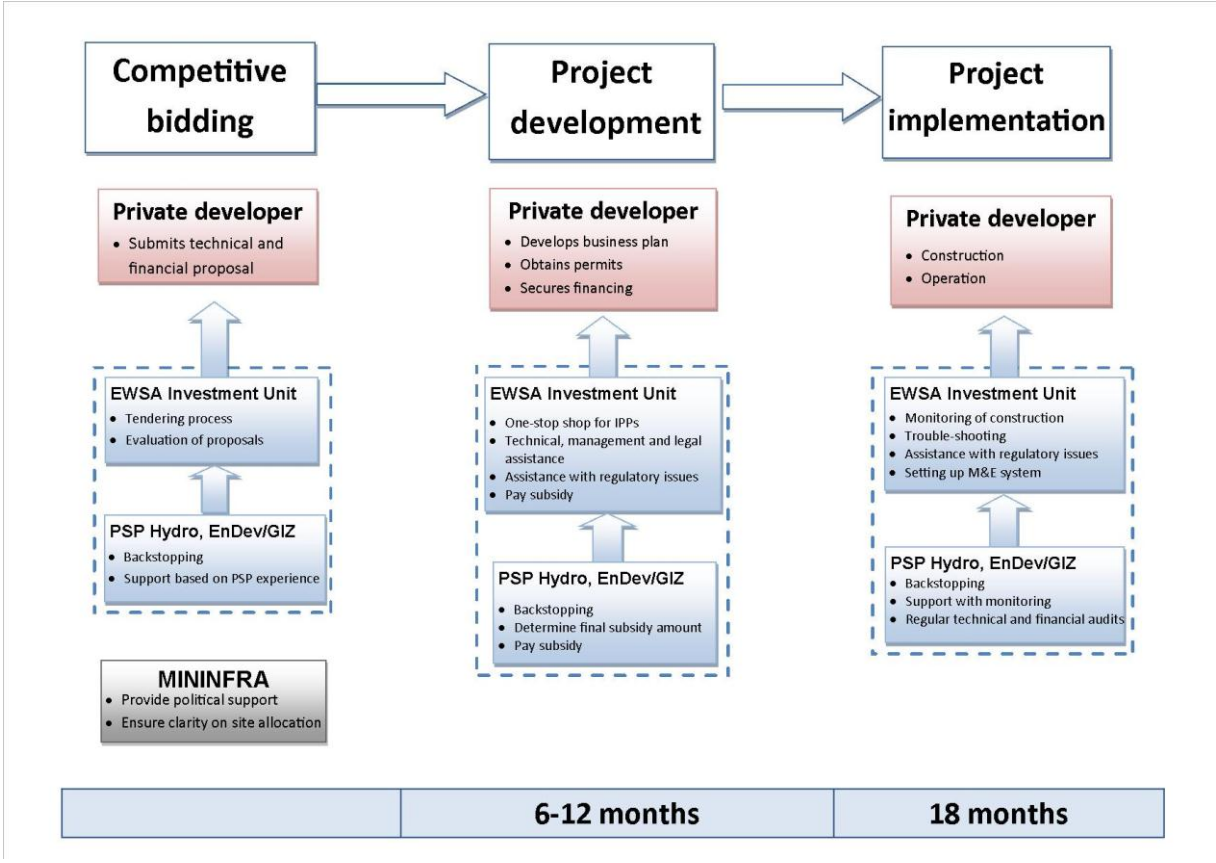
Technical assistance will also be required in order to specifically promote the Rwandese private sector. International companies and investors have started to show interest in the local hydropower sector and several are already working in the country. However, in order to support the development of the nascent industrial sector in Rwanda, it is proposed to fix minimum requirements on local content for the PSP tenders. This means that applicants would need to be either Rwandese firms or joint ventures between a Rwandese firm and an international partner. Nevertheless, based on the experience of the PSP Hydro project with previous tenders, this might require substantial technical assistance, in order to ensure a short timeframe for project development and implementation.

Integration of the PSP Hydro project into these EWSA structures would contribute to further integration of services for the private sector into EWSA core structures. It could also prevent the establishment of parallel structures; this might happen if PSP Hydro was perceived to be the entry point for private investors in EWSA. While EWSA's EIU will take the lead role, support from PSP Hydro will be available to ensure good knowledge transfer (e.g. tools developed by PSP Hydro, processes, contacts and networks). PSP Hydro would also support an effective monitoring and reporting system that fulfils the requirements of the EnDev programme. This is outlined in more detail under 3.2.4. As a result, PSP Hydro could make a considerable contribution towards further consolidating and strengthening national institutions responsible for private sector development. This set-up was strongly supported by the DG of EWSA who pledged to mobilize additional resources to reinforce this unit and create synergies with the capacity development that would take place through the PSP Hydro collaboration.

Bidding process

The following process has been developed by EWSA's Energy Investment Unit (EIU) for the PSP Hydro upscaling proposal. Under this PPP approach, EWSA would deal with companies as a full Independent Power Producers, responsible to design, build, finance, own and operate the MHP plant. EWSA would function as the sole off-taker and through the EIU handle the bidding and selection process. EnDev funds would be used to bridge the "viability gap" for funding and provide technical support to EWSA (see Graph 1).

Graph 1: Investment process for PSP Hydro upscaling proposal:



In the first phase, EWSA would lead a competitive bidding process to bring the selected hydro sites to market: A two-staged procurement process is envisaged, including an expression of interest and a proposal phase with a request for proposal. In a first step, companies are invited to submit an Expression of Interest (EoI) outlining their interest in the tender, as well as demonstrating the capacity of their firm. Pre-qualified bidders should clearly state for which sites they are bidding and this can also be a combination of two or more sites.

Conditions for applying will be constitution as a private company, as this remains the target group of the project; firms with Government shareholding will not be eligible. Participation of Rwandese private firms will be positively evaluated to achieve Government goals of developing the local private sector; minimum criteria for eligibility will be application by a Rwandese owned private company or by a joint venture between a Rwandese and an international company, with transparent shareholding structure. Also, criteria will be set to ensure no monopoly situation is created in the market by companies obtaining too many sites.

Companies reaching the required minimum of points will receive the feasibility studies for the sites from EWSA. Companies will develop a full financial and technical proposal to win the contract to design, finance, build, own, operate and maintain the Project.

The proposal should encompass the design of the plant, including potential changes to the design proposed in the F/S, management structure for construction and operation, as well as the financial analysis and subsidies needed. The requested viability gap funding will serve as the financial bidding variable, as the tariffs are fixed in REFIT regulations. While competitive bidding provides an excellent mechanism to identify market prices, given the state of competition in the Rwandese market, special care will be taken to exclude the possibility of exaggerated prices in the bids. Therefore the existing benchmarking tools of PSP Hydro will be used for detailed analysis and comparison. As in previous PSP Hydro supported projects, the

correct use of funds will be verified through technical and financial audits to exclude the possibility of fraud.

To evaluate the technical and financial proposals, a combination of factors will be applied. Technical and financial elements will be weighted as follows:

Total score = Technical Evaluation Score * 70% + Financial Evaluation Score *30%

In the project development phase, developers will be supported by EWSA through limited technical, management and legal assistance, as well as support on regulatory issues. Project implementation will be the sole responsibility of the project developers.

In order to expedite this process, and inform the private sector, the DG EWSA proposed to organise a workshop between EWSA, the Rwandan Private Sector Federation (PSF), EnDev Rwanda/PSP Hydro and local project developers. This should serve to inform them about the upcoming tender and to ensure them of the technical support from EWSA/PSP Hydro.

Financial support

As part of the bidding process, companies will request the amount of subsidy that is required to implement the project. As a general rule, subsidies will be determined at a level sufficient to give an internal rate of return (IRR) for the project developer of 20% (viability gap funding), capped at a maximum of 40% of the investment cost. The remaining costs have to be financed through equity (minimum 15%) and a commercial bank loan. Based on these parameters as well as the investment costs provided in the draft feasibility studies and the existing Renewable Energy Feed-In Tariffs (REFITs), the amount of subsidy required has been modelled (see table 1). The financial analysis of the sites shows that sites could be developed by the private sector with a subsidy of on average 14%. The subsidy required will differ based on the different sizes and locations of these plants. For the larger plants, a subsidy might not be needed, while smaller plants might require a subsidy of up to 40%.

Nevertheless, amounts should be considered indicative as outlined above (chapter 3.2.1).The feasibility studies developed by international consultants have a much higher specific cost (6,500 USD/kW) than the first projects developed by private companies under the PSP approach. As mentioned above, it can be expected that the actual cost would be lower for some plants, especially as a result of the competition introduced by the bidding process, while some of the bigger plants might actually be more expensive.

With a total amount of subsidy of EUR 3 million, a total capacity of 5.4 MW could be developed. If in total the plants require less subsidy than indicated by the feasibility studies, it is proposed to develop additional sites, chosen from the existing list of 69 sites; for this a second round of bidding could be initiated.

Table 1: Overview MHP sites and financial analysis

Site ID	Site name	District	Capacity (kW)	Cost (€)	Specific cost (€/kW)	equity	subsidy	bank	IRR	PBT	subsidy (€)
OKA-19	Mbirumbe A	Karongi	305	1.361.751	4.465	15,00%	39,00%	46,00%	19,92%	5,24	531.083
OKA-20	Mbirumbe D	Karongi	299	1.154.448	3.861	15,00%	30,00%	55,00%	20,47%	5,25	346.335
ONG-09	Muhembe	Ngororero	323	1.282.697	3.971	15,00%	32,00%	53,00%	19,75%	5,24	410.463
ONG-10	Satinsyi	Ngororero	493	2.100.433	4.261	15,00%	38,00%	47,00%	19,48%	5,24	798.165
ONS-07	Nyarubandwa IV	Nyamasheke	325	1.279.395	3.937	15,00%	31,00%	54,00%	20,24%	5,24	396.612
ONS-09	Kilimbi I	Nyamasheke	540	1.430.529	2.649	15,00%	0,00%	85,00%	19,84%	6,34	0
ONS-10,-11	Kilimbi II, III	Nyamasheke	1.109	2.700.271	2.435	15,00%	2,00%	83,00%	20,01%	6,34	54.005
ONS-17	Nyirantaruko	Nyamasheke	1.263	2.634.264	2.086	15,00%	0,00%	85,00%	31,74%	4,28	0
ONS-19	Nyirahindwe I	Nyamasheke	909	2.247.703	2.473	15,00%	0,00%	85,00%	26,48%	5,32	0
ONS-20	Nyirahindwe II	Nyamasheke	359	1.391.937	3.877	15,00%	30,00%	55,00%	19,74%	6,30	417.581
			5.925								**2.954.244**

The formula developed under PSP Hydro for counting electrification through on-grid plants was used to calculate the expected beneficiaries. As the formula is based on the number of households connected and amount of electricity fed into the grid annually, projections for 2016 provided by EWSA Electricity Planning Unit were used to calculate the beneficiaries. The Electricity Planning Unit considers 100,000 household connections per year as a realistic projection; this would translate into additional 89,640 people gaining access to electricity through the next phase of the PSP Hydro project. Nevertheless, the Rwandese power sector is very dynamic, and many projects are under way. Quicker or slower progress of projects (both generation and grid extension) will impact on the number of beneficiaries – faster household connections would bring that number up, while faster progress in expanding generation capacity would bring it down.

Technical support

Technical support from the PSP Hydro project for this process will be different from previous phases. Until now, most support to private project developers has been provided directly by the PSP hydro team. In the future, these activities will be internalised more and more by EWSA, as a transition to institutionalising this process. The Director General of EWSA has already stated that within EWSA, the Investment Unit (with technical support from the 69 project team) will take a lead in taking on these responsibilities. The different stakeholders will have the following roles during the project phases:

1. Competitive bidding phase

MININFRA: ensure clarity on site allocation process, provide political backing/support

EWSA: Investment Unit responsible for the tendering process

GIZ: backstopping for EWSA Investment Unit, provide support based on experience from previous tenders

2. Project development phase

MININFRA: ensure smooth site allocation process

EWSA: Investment Unit as the one-stop-shop for IPPs; provide technical assistance on process and necessary permits (EIA, license); broker support from other units in technical questions and for business plan development;

GIZ: backstopping for EWSA Investment Unit in supporting private project developers, based on experience from previous tenders; support on business plan development and financial modelling, determine final subsidy amount (viability gap funding) required, technical support on final project design; management and legal support; support in setting up of an accounting system. In addition, GIZ will provide the payment of subsidy to project developers through a financing agreement.

3. Project implementation phase

MININFRA: ensure smooth site allocation process, provide political support

EWSA: monitoring of construction; trouble shooting; assistance with regulatory issues; setting up M&E system.

GIZ: support EWSA Investment Unit in setting up of a monitoring system, oversight on construction process, organisation of regular technical and financial audits (incl. final audit after commissioning of the plant)

4. Expected Impacts of the Project Intervention

Impact	Possible Indicators
Environment	Reduction of CO_2 emissions, due to lower CO_2 emissions per kilowatt hour from hydro plants compared to diesel fuel plants
Health	Reduction of indoor air pollution from candles and kerosene that causes bronchial illness Reduction of risk of fires caused by open flames
Poverty/Livelihood	Household savings from reduction of high annual expenditures for traditional lighting fuels, annual cost savings of EUR up to 100 for households) Productive use of electricity for lighting shops, saloons, use of electrical equipment in workshops Private sector development that will lead to employment and economic development in rural areas. Leveraging private finance will relieve public finances and allow for the reallocation of resources to other projects.
Education	Children can use the light to study after dark; this has the potential to improve education Access to information via mobile phones, radio, internet
Governance	EWSA uses private sector approach as a strategy to increase generation capacity Time for development of private hydro projects is significantly shortened, as compared to the previous PSP Hydro tenders Structures for private energy investments are strengthened 5 Rwandese companies are active in the hydropower sector

5. Budget

		EUR
1	Human resources and travelling	1,485,483
2	Equipment and supplies	56,914
3	Funding financing agreements/local subsidies	1,131,741
4	Other direct costs	33,540
5	Total direct costs (sub-total)	2,707,678
6	Mark up costs/administrative overheads/imputed profit	292,322
7	Cost price	3,000,000[32]

[32] In addition to the proposed € 3 million up scaling budget, the implementation of the activities described in chapter 3 require an additional amount € 1 million. This amount of € 1 million will be reallocated from unused funds from the EnDev 2 biogas project, which ended in 2011. It will be added to the funds available for MHP subsidy (”3 Funding financing agreements”).
The MHP subsidies/financing agreements (€ 2.131.741) should be able to leverage private investments of up to € 13 million, leading to a development of 5.4 MW of additional MHP capacity.

Uganda

Promoted technology	MHP / PV and Pico PV systems / stoves		
Project period	Old: 4.2009 – 12.2014 New: 4.2009 – 12.2017	**Project budget:**	Old: EUR 6,000,000 New: EUR 14,500,000 (EUR 6 million old budget; EUR 2 million up-scaling; EUR 6.5 million co-financing by EUEF, still subject to approval by EC)

Target Groups	Households, social/public institutions, small and medium sized enterprises (SMEs)
Lead Political Partner	Ministry of Energy and Mineral Development (MEMD)
Implementing organisation	GIZ
Implementing partner	Rural Electrification Agency (REA), private sector, NGOs
Involved bilateral / multilateral programmes	GIZ programmes at the Office of the Prime Minister (OPM) and Financial Sector Development (FSD); Energy for Rural Transformation (ERT) II Programme financed by World Bank, especially with regards to the Photovoltaic Targeted Market Approach (PVTMA).
Summary of Key Interventions and Outputs	The programme has two components: (1) Energy for lighting and electric household appliances (grid connection, stand-alone and mini-grid solar PV), (2) Cooking Energy for households.

Target (number of beneficiaries)	**Old Target**	**New Target**	
Energy for lighting / electrical appliances in Households	12,500	52,500	people
Cooking energy for households	600,000	600,000	people
Electricity and/or cooking energy for social infrastructure	200	238	institutions
Energy for productive use/ income generation	100	2,500	SMEs
Project Manager	Name: Markus Exenberger, email: markus.exenberger@giz.de		

1. Situation Analysis

1.1 Energy Situation

Development of the energy sector is key to economic growth in Uganda. The country has a total energy consumption of approximately 11 million toe (tonnes of oil equivalent) (2010). This demand is met by various resources, including solar and biomass energy, hydro power and fossil fuels. Biomass energy is used by 97% of the population, in the form of firewood, charcoal or crop residues to satisfy the need for cooking and water heating in rural and urban areas and accounts for 91.5 % of the total primary energy consumption. Due to this heavy dependence on biomass energy, 30% of rural regions in Uganda register a rapid depletion and overuse of forests. Currently only 7% of Uganda's land area is covered with forest. Most severely affected is the tropical high forest which has been reduced from about 19% coverage of Uganda to a mere 3%. Deforestation continues at a rate of 2.2% per year of the remaining forest coverage, leading to fuel wood scarcity in rural areas and an increase in price

levels of charcoal and fuel wood in urban areas (about 6% per year). The speed of deforestation partly is due to the use of inefficient three-stone fires.

According to available data, Uganda's electrification rate is 12% at national level and 5-6% in rural areas. Especially rural households strongly rely on traditional lighting technologies (e.g. candles or kerosene lamps) that give poor quality lighting, emit noxious fumes and present a hazard in terms of fires or burns, especially for children. The majority of social institutions in rural areas do not have access to electricity, significantly lowering the ability to deliver good quality services. Lack of access to electricity also is a key factor obstructing local economic development; lack of electricity hampers establishment of businesses and job creation that require electricity and forces companies to buy diesel or petrol generators that are costly to operate. In addition, lack of electricity limits access to information and communication technologies, which contributes to continued isolation of rural areas. Although the Government of Uganda acknowledges this challenge, funds and human resources are limited and focus mainly on the national centralised grid. With the commissioning of the Bujagali power plant in 2012 the power crisis causing massive load shedding has been overcome – for now. Load shedding is expected to dominate the power supply system starting from 2015 again, as increasing generation capacity cannot keep pace with increasing demand. On the distribution side, governmental grid extension plans focus on connecting bigger towns and industrial clusters to the grid – leaving out most of the rural communities. Even rural communities located along main road and power lines usually do not have access to electricity, because low voltage power lines are only constructed in densely populated and economically vibrant urban areas. In conclusion, an approach for access to electricity is needed, that enables rural communities far of the national grid to benefit from reliable and affordable electricity supply.

1.2 Policy Framework, Laws and Regulations

The government of Uganda has over the past eight years embarked on a Power sub-Sector Reform Programme which has seen the implementation of significant structural changes within the sector. The reform programme is aimed at providing adequate, reliable and least-cost power supply to meet the country's demand, promoting the efficient operation of the power sector and scaling up rural and peri-urban access to energy. These reforms have established a solid framework, while the country continues to experience significant challenges in increasing access to modern energy services. A low level of access to modern forms of energy, particularly electricity, has continued to be one of the major infrastructure bottlenecks to socio-economic growth in Uganda. Of special importance for the sector is the Electricity Act (1999) and the Renewable Energy Policy (REP) for Uganda (2007).

Energy is also an integral part of the Ugandan government's Poverty Eradication Action Plan (PEAP) which includes frequent references to the link between energy and poverty alleviation. The Ugandan government has set the target of providing 10% of rural population with access to electricity until 2012. It was planned to be achieved by grid extension (including through private sector involvement), mini-grids and stand-alone electrification systems. The national electrification rate has been increased to about 12% – but in rural areas only 5 to 6% are electrified. Hence, further interventions are needed to achieve the targets and increase access to electricity. Therefore, the Government of Uganda through the Rural Electrification Agency (REA) is in final stages to publish a revised Rural Electrification Strategy.

Though the Renewable Energy Policy shows some emphasis on the biomass sector in Uganda, it is less understood and heavily underfinanced. Currently the Ministry of Energy and Minerals Development (MEMD) has embarked on the development of a Biomass Energy Strategy in cooperation with UNDP, GIZ and other partners.

1.3 Institutional Set-up in the Energy Sector

There are three main government institutions dealing with renewable energies for power generation:

a) The Ministry of Energy and Mineral Development (MEMD) is the lead agency in the energy sector. The Ministry is responsible for policy formulation, promotion, coordination, monitoring and evaluation. MEMD is also responsible for initiating legislation in the energy sector. Uganda's National Energy Policy is so far centralised, i.e. there are no energy officers at sub-national/district level. Part of MEMD is the Energy Department (ED), which is structured according to sectors. ED comprises four divisions "Energy Efficiency", "New and Renewable Energies", "Electric Power" and "Provision with Oil Products".

b) The Rural Electrification Agency (REA) functions as the secretariat to the Rural Electrification Board, which realizes MEMD's rural electrification plans as stipulated in the Indicative Rural Electrification Master Plan. REA controls public funds as regards the subsidisation of rural electrification projects.

c) The Electricity Regulatory Authority (ERA), which was established by the Electricity Act of 1999, is in charge of issuing licenses for generation, transmission, distribution or sales of electricity. ERA also has the mandate to establish a tariff structure and investigate tariff charges and approve the rates of charges.

Regarding biomass, the New and Renewable Energies Division of the MEMD has been coordinating the dissemination of improved cook stoves and other biomass technologies. The private sector association "Biomass Energy Efficient Technologies Association" (BEETA), consisting of mainly improved biomass stoves businesses is one more institution advocating biomass issues and gaining strength by the day.

1.4 Major Donor Activities

Uganda has a large community of international development partners in the energy sector, who coordinate activities through the Energy and Mineral Development Partners Group (EMDPG), which meets on a monthly basis. Germany is leading the group since November 2010. Most development partners focus on the supply side of the power sector as well as electricity transmission and distribution. A new field of support is the oil and gas sector after discovery of fossil resources in the country. German Development Cooperation and Energising Development are the key partners of the Ugandan Government in the field of access to modern energy services (electricity and biomass energy).

The following table shows an overview of the on-going and foreseen projects by main focus and donor in the energy sector in Uganda:

Donor	Activity focus
EIB	Reduction of distribution losses
EU	Development of renewable energy markets with focus on micro finance energy enterprises; dissemination of efficient cook stoves in some districts
France	Power transmission; Reduction of distribution losses
Germany (KfW)	Power generation with focus on large hydro power; Distribution and grid extension; Power transmission, Reduction of distribution losses
Japan	Power generation with focus on large hydro power; Distribution and grid extension; Power transmission
Norway	Power transmission; Power distribution; Power generation; Oil & Gas
UNDP	Sustainable charcoal production (policy level and 2 districts); Preparation of activities in the field climate change / clean technologies /technology transfer
US	Oil & Gas sector with focus on environmental issues

Table 1: On-going and foreseen projects by main focus and donor in the energy sector in Uganda (Source: Donor Working Group)

2. Planned Outcome

Energy Service Segment	Old target	New Target
Energy for Lighting & Electric HH Appliances	12,500 people	52,500 people
Cooking Energy for Households	600,000 people	600,000 people
Electricity and/or Cooking Energy for social infrastructure	200 institutions	238 institutions
Energy for productive use/ income generation	100 enterprises	2,500 enterprises

The target calculation is based on an average household size of five people in 30 rural communities with an average number of 150 households; resulting in 4,500 households with additional 22,500 people. The new target has been calculated taking the achievement as per June 2013 with nearly 30,000 people reached as the basis.

3. Project Approach

This proposal relates to co-funding for an application submitted to the EC on 3rd June 2013 in the context of the 2nd Call for Proposals launched in April 2013 of the ACP-EU Energy Facility II as an open call for proposals in the frame of the 10th European Development Fund. The global objective of the call is to contribute to the achievement of the Millennium Development Goals (MDG) on poverty alleviation. The specific objective of the call is to increase and improve access to modern, affordable and sustainable energy services for rural poor by focusing on renewable energy solutions as well as on energy efficiency.

Around these objectives EnDev Uganda jointly with Mercy Corps and Konserve Consult Ltd. developed a comprehensive project proposal providing access to electricity in rural areas based on renewable energy through solar power generation and mini-grids with high involvement of the private sector – both financially as well as in terms of scheme operation. The project submitted is called “Boosting Energy for Sustainable Markets to Accelerate Rural Transformation (BE-SMART)”. All EC funds will be channelled through GIZ accounts; also the one that will be used by Mercy Corps.

GIZ Promotion of Renewable Energy and Energy Efficiency (PREEEP)/Energising Development (EnDev) Uganda has submitted the full application to the EC in time, notification of the award is expected in November 2013, while contract signature is anticipated for the last quarter 2013.

Although EnDev is positive about being successful with the submitted application for BE-SMART and expecting a notification of award by September 2013, it is wise to consider alternative options. In case, BE-SMART is not contracted by the EC, EnDev will still be in a position to implement the project as planned – yet of course on smaller scale. If the alternative scenario becomes reality, budget, targets and implementation plans will be adjusted accordingly.

3.1 Energy Technologies and Services Promoted by the EnDev Project

EnDev Uganda has identified significant upscaling potential in the field of mini-grids based on solar power and is targeting to electrify 30 rural communities with an average of 150 households, up to 2 social institutions and 80 very small, small and medium sized businesses each. All communities targeted are located far off the national grid and will not be electrified

within the next five to ten years according to current national grid extension strategies and plans.

The proposed action takes advantage of rapid growth in the Ugandan telecommunications sector. By taking into consideration the needs of the mobile network towers for alternative energy supply, it was feasible to establish an innovative private operator model providing pay-as-you-go solar mini-grid electricity for households, small and medium enterprises (SMEs) and social and public institutions (Pillar 1). The proposed action will further leverage economic activities along local value chains and products by fostering productive use of energy and energy related services and products which will catalyse sustainable local and regional economic growth (Pillar 2).

In rural areas, mobile phone masts are often located close to local communities. Currently, mobile towers are mainly powered by diesel generators, while the communities have no access to electricity. The activities proposed in this proposal aim at bringing together the mobile phone companies energy needs at the mobile phone mast as anchor load, with the electricity demand of surrounding villages. While the power supply for the mobile phone mast is a self-sustaining business model, the outreach into the surrounding communities requires support for the project preparation, community work and grid infrastructure in order to be viable. This forms the basis for a private sector oriented business model for rural electrification that has already proven its sustainability and up-scaling potential: In the frame of a PPP project financed by the German Government, a solar company has been supported by GIZ to implement a pilot village in central Uganda connecting the mobile mast and the close by village to a solar powered mini-grid. The solar company successfully operates the scheme. In addition, the solar company and one of the leading mobile phone companies in Uganda are in final stages to sign a contract to roll-out the fuel switch to 180 mobile masts throughout the country. A desk study conducted for a preliminary assessment of potential sites has shown that about 30% of those 180 masts are located sufficiently near to rural communities. As a next step further analysis has shown that out of those 30% a minimum of 30 villages have the economic potential, size and settlement structure to be electrified alongside the mobile tower.

One key benefit for the local households who acquire an electricity connection is the use of a pay-as-you-go prepaid meter system, enabling people to plan for energy expenses in advance and consume the amount of electricity they can afford. The prepaid meter system allows for transparent accountability, whereby the consumers are able to learn about their energy consumption and remaining credit in real-time. In addition, being able to pay in advance and in smaller purchases, matches the local habits of energy supply for traditional energy sources like candles, kerosene or firewood/charcoal.

Solar companies will act as operators, installing “solar containers”[33] that supply energy to serve the mobile tower and the rural community on their own cost. Hence, the financing, installation as well as operation & maintenance of the solar containers is fully handled by the private sector. The mobile towers act as anchor load customers, while a tailored tariff and payment system (via mobile money and pre-paid meters) is used for the communities. The tariff model has been developed by GIZ in cooperation with the private sector and a detailed business plan and model calculated. The pilot village mentioned above operates successfully since May 2013 on that basis.

While the private sector investment for the generation capacity for the mobile mast is a self-sustaining business model not requiring any governmental or donor support, the electrification of the rural community needs support to be realised. The detailed economic analysis and development of the business model has shown that without financial support the operation of

[33] Energy containers are modular off-grid solar generators fitted with mono-crystalline high-performance PV modules, battery bank and inverters. Modularity, reliable availability and dynamic expandability to rising energy demands are the strong features of this technology, making it highly responsive to the challenges in off-grid and rural settings.

the mini-grid will not be economically feasible for a private sector company. Therefore, the technical and financial support from EnDev and the EU shall close that gap. The generation capacity for the rural community will be financed by the private sector company and remain in their ownership, while the mini-grid is financed by EnDev and the EU and will be handed over into ownership of the Rural Electrification Agency (REA). Under this assumption the operation and maintenance of the whole energy supply system (mobile mast and local community) becomes economically viable from a private sector point of view. One potential private operator has already applied for the required legal permits to act as concessionaire of mini-grids and power supply for mobile masts. Other companies have been identified with a similar company profile and solar product range. (See below more details for option of integration into national grid in the future.)

Electricity is generated by a standardized solar container (see figure 1 below) of 19,200 Wp each. This technology qualifies for remote and hard-to-reach locations since it can be easily transported, re-deployed and installed within a short period of time. Depending on the size of the village, several containers can be combined to yield the required generation capacity for a specific context.

Figure 1: General design of a solar container (source: GIZ)

The solar container is placed either next to the mobile tower or at a more suitable location according to the specific layout of the rural community. Generated energy is then fed in a three-phase low voltage mini grid as illustrated below in figure 2:

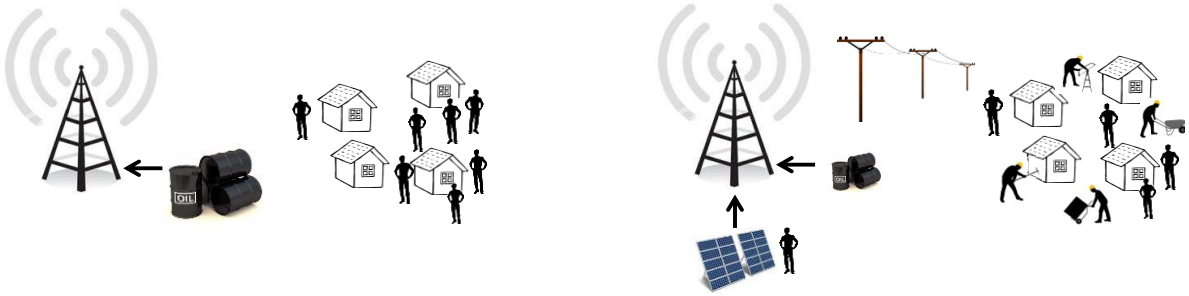


Figure 2: Set-up of energy generation by a solar container, network mast remains with diesel based emergency backup (source: GIZ)

To ensure the possibility of future integration into the national power supply grid, the mini-grid infrastructure is technically compatible with the national grid and complies with Ugandan standards. If the extension of the national grid reaches a community electrified in the context of this project, the private operator will disconnect the solar container and can transport it to a new site. The operation of the mini-grid will be included into the concession of the operator of the national grid and connected to the national grid after technical inspection.

3.2 Approach to provide electricity to households

The technology of choice and business model for this proposal is described above; how to work with the rural communities and local authorities to implement the project is described in this chapter. Figure 3 below summarizes the project implementation phase and main tasks.

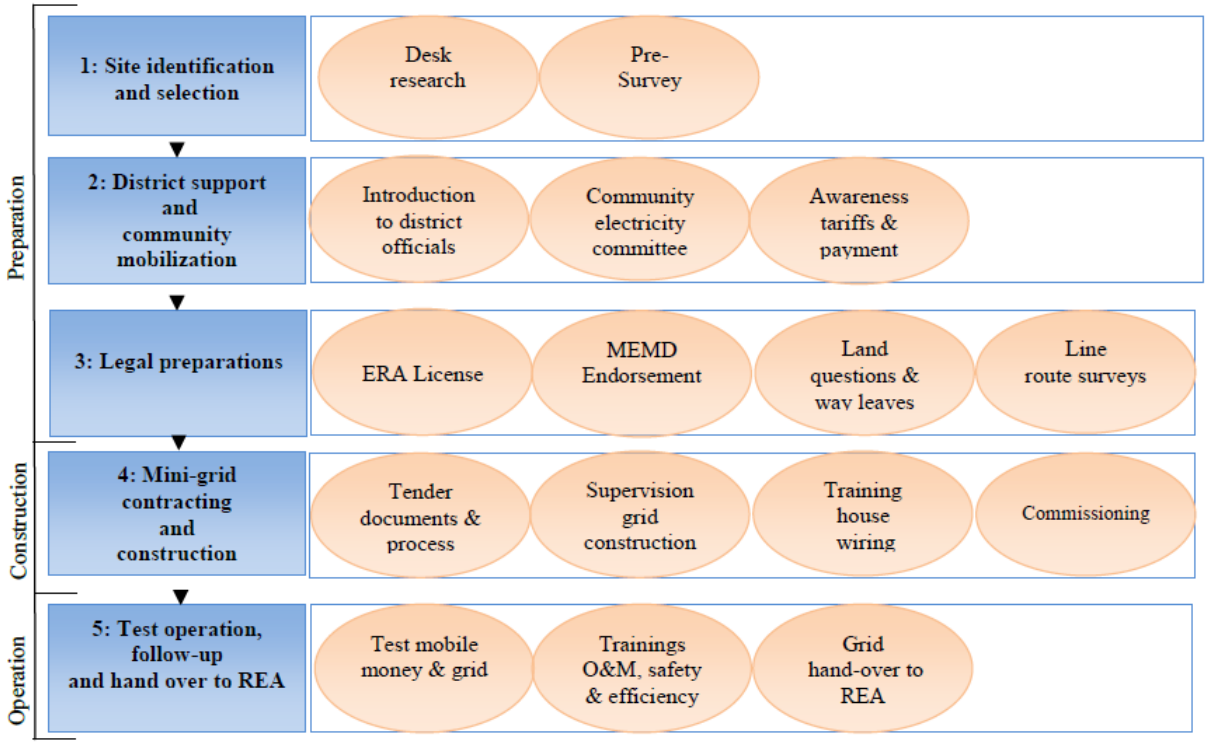


Figure 3: Overview project implementation of electrification component of BE-SMART

1) Site identification and selection

Site identification and selection will be done based on the existing set of selection criteria to identify potential beneficiary communities. The approach is tailored to the specific business model of the proposed energy option.

To date, the detailed assessment methodology of the desk study using Geographical Information System (GIS) has been applied successfully to 72 out of 180 off-grid mobile tower sites, stating that more than 16 villages are suitable for connection (23%). The remaining 108 potential project sites will be assessed in detail at the beginning of the implementation of the project and is, based on the above assumption, expected to be <30%. All sites compliant with the criteria outlined above will undergo further field

Site Selection Criteria
Minimum criteria
100 households minimum
5-10 years minimum wait to connect to national grid
5 km minimum distance between mobile tower and national grid
5 km maximum distance between town and the mobile tower
Strong community and local government support
Key considerations
Town well-positioned to impact broad economic growth
High number of businesses and manufacturers
High number of social and public institutions
Densely populated town

study analysis (bundling projects sites by regions/districts). The final report will summarize findings, analysis as well as site selection rankings and rationale.

2) District support and community mobilization

GIZ will apply and scale the mobilization process which has been successfully proven at the pilot scheme which is based on years of experience working with rural communities in Uganda. GIZ will involve local district officials (Chief Administrative Officer etc.), and seek full political support from the district. The districts play a crucial role in mobilizing the respective communities, helping to facilitate agreements while concurrently serving as a legal entity to speak on behalf of the community. The community is assisted to set up a community electricity committee. The elected chairperson will be the direct contact person for any emerging community questions, feedback from the community, and joint planning and awareness activities. The committee will register members interested in connecting to the grid and members will pay a partial advance on the connection fee via mobile money to the operator's account.

3) Legal preparations

GIZ will support private operator(s) to apply for the "Certificates of Exemption" from ERA ("Electricity (License Exemption) (Isolated Grid Systems) Order, 2007) to allow them to generate, distribute and sell electricity in Uganda. An important part of the preparation phase is to solve issues on land rights and way leaves (rights of way for the mini-grid). GIZ will assist private operator(s) to identify suitable locations for the solar container and grid infrastructure.

4) Mini-grid contracting and construction

Based on a detailed line route survey, GIZ will steer the tender and contracting process for the supply, construction and commissioning of the mini grids. In parallel, the private operator will install the solar container. Compliant with the action's commitment to local capacity development, existing ERA certified wiremen as well as new wiremen will be trained in order to provide a sufficient number of wiremen per district performing high quality house wiring.

5) Test operation, follow-up and handover to REA

During test-operation, GIZ and the respective private sector operator will jointly test and confirm the functionality of the whole energy system (electricity generation, distribution, service connections and payment procedures). The community electricity committee will select one person to receive basic technical training and to act as a contact person for follow up activities. In addition, community members will be sensitized about health & safety as well as energy efficiency potentials. These measures safeguard local ownership and boost the number of effective service connections in order for the grid to benefit the maximum number of people. GIZ will support the negotiation process between REA and the operator to set an agreement for a lease between both parties. The agreement will provide the basis for the future set up – establishing REA as the legal owner of the mini-grid after official handover.

Roles of implementing partners: GIZ, Mercy Corps and KCL will work closely with various governmental and private sector partners. GIZ and KCL in cooperation with the Rural Electrification Agency (REA) will support the construction of the mini-grid, while the private sector partner provides all movable assets (solar container and pre-paid meters). GIZ and KCL will work jointly on community mobilization and sensitization; community contributions will include support on land issues (rights of way and location of solar container), paying connection fees, organizing for house wiring, and paying electricity bills. The initial investment costs are on average shared equally (50/50) between GIZ/EU and the private operator. Mercy Corps will implement pillar two of the BE-SMART project concept focusing on productive use of energy and inclusive local economic development. It is important to note that no EnDev funds will be used to finance any of the pillar two activities.

4. Expected Impacts of the Project Intervention

Impact	Possible Indicators
Environment	Renewable development path for targeted areas.
Health	Access to electricity facilitates night emergency services and improves standard of living of staff. Risk of burns using kerosene lamps reduced.
Poverty/Livelihood	SMEs generate income from productive use of energy and new jobs are created.
Education	The awareness and understanding regarding renewable energy issues of students in target schools is enhanced Schools with access to electricity provide classes and study time in the evenings, offer additional classes and the standard of living of staff is improved
Governance	District officials and community leaders develop by laws and ordinances in support of the dissemination of improved stoves and solar PV technologies in their districts.

5. Budget

	EUR
1 Human resources and travelling	2,080,600
2 Equipment and supplies	2,262,250
3 Funding financing agreements/local subsidies	1,740,000
4 Other direct costs	1,323,575
5 Total direct costs (sub-total)	7,406,425
6 Mark up costs/administrative overheads/imputed profit	1,093,575
7 Cost price	8,500,000

The budget of EUR 8.5 million is subject to approval of the co-financing by the EU Energy Facility. If the co-financing is not approved, the budget will be reduced to EUR 2 million, with activities and targets reduced accordingly.

Annex 1

Consultant's recommendations to improve the quality of RBF proposals and EnDev response

Recommendation	Comment
The proposals could provide a clearer articulation of additionality of the RBF project	This is a precondition for any EnDev project to happen and was therefore implicitly implemented. It could have been emphasized more in the proposals of the 1st tranche of projects. 2nd tranche project will have to provide more information on their added value compared to the BAU scenario.
Analysis and evidence of the rationale and the price setting of the incentive could be strengthened. The same holds for the market development hypothesis.	This will be strengthened in both the 1st and 2nd tranche projects, with the understanding that market development hypothesis will have a speculative character in many cases. All 1st tranche projects have undergone a revision of the incentive structure and amount.
In most cases the projects set the incentive. It was recommended to make more use of "market sets price" mechanisms	Bidding, auctions and volume based incentives will add to the diversity and learning of the RBF mechanism. In some cases a limited "price finding phase", as recommended by some reviewers, can be an effective instrument to determine appropriate incentives. Mechanisms where the market sets the price will be favoured in the 2nd call. However, setting the start incentive will often remain speculative to some extent. It is expected that this can be mitigated by yearly reviews of the incentive amount.
The involvement of FIs should commit to the sector beyond RBF transactions alone.	FIs are more than welcome to engage with their own capital, as long as exclusivity is avoided. In fact in some of the projects FIs already indicate to be interested in providing working capital loans for the energy access sector.
It was recommended to aim for high levels of social inclusiveness	EnDev is already targeting poor rural population, with a high level of inclusiveness. However, a sustainable commercial market, the primary goal of RBF, will often only target the poor, not the poorest of the poor.
Strengthen the participatory approach in project design	Although it is EnDev's regular approach to base its interventions on the discussions with all actors in the sector, including the beneficiaries, this will be strengthened for RBF Involving final beneficiaries and entrepreneurs in the market design phase is most relevant for success. Additionally, final beneficiaries opinion and feedback needs to be part of the annual revision of the RBF incentive.