

# **Progress Report 2011**

on

## **Energising Development – Phase 2**

Partnership between

**The Bundesministerium für wirtschaftliche Zusammenarbeit und  
Entwicklung (BMZ),**

**The Netherlands Minister for Foreign Affairs**

and

**The Norwegian Minister of Foreign Affairs**

executed by

**The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)  
GmbH**

In cooperation with:

**Agentschap NL**

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## A Executive Summary

In September 2008 BMZ and DGIS agreed to implement a second phase of the Dutch-German Energising Development programme. In the new phase (EnDev 2) the programme is supposed to provide additional 3 million people with access to modern energy services, which will contribute to sustainable development and poverty reduction.

In 2011, the EnDev Partnership comprised 19 activities in 18 different countries. The focus is on partner countries of the Netherlands and Germany, and particularly on those in Africa. 59 per cent of the EnDev 2 funds are allocated for Africa.

Until December 2011, EnDev 2 provided 3.5 million people with sustainable access either with electricity by connecting households to the central grid, a mini grid powered by hydropower or through photovoltaic systems or with improved cooking technologies, such as improved firewood and charcoal stoves or biogas plants (Table 1).

In addition, more than 4,000 social institutions got access to improved cooking energy or electricity, or other modern energy carriers and 13,970 small and medium enterprises were provided with a modern form of energy for productive use.

Lighting/ Household application	Cooking	HH Total
0.8	2.7	3.5
Table 1: Adjusted number of people with access to modern energy (EnDev 2; in millions)		

These figures take into account:

- a “sustainability adjustment factor,” which takes into consideration 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 welfare institutions, which received an improved stove or other modern cooking energy technologies but already had access to electricity

**The number of people, which got sustainable access to modern energy services on household level through the EnDev program (phase 1 and 2), amounts to 8.52 million.**

EnDev has studied 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 (MDGs) and to check the sustainability of the EnDev results and impacts. Results of studies in Uganda, Bangladesh, Ethiopia, Malawi, Nicaragua and Senegal studies were presented in previous reports. In the present report key results of studies in 2011 are summarized.

The expenditures for EnDev 2 activities in 2011 amounted to EUR 22.6 million.

## **B Introduction – Energising Development Partnership – Phase 2**

### **B.1 Overall Objective of the Partnership**

In December 2004 the former Netherlands Minister for Development Cooperation (DGIS) (now the Ministry for Foreign Affairs) and the German Federal Ministry for Economic Cooperation and Development (BMZ) launched a partnership on Energy Access. The Partnership aimed at providing 3.1 million people in developing countries with sustainable access to modern energy services till 2009. In 2008 the Netherlands and Germany decided to extend the partnership on energy access and to continue the Energising Development Programme till 2012 aiming at providing an additional 3 million people with modern energy services. In 2011 the partnership was extended till December 2014. In addition, in December 2011 the Norwegian Ministry of Foreign Affairs joined the partnership. The objective of the Energising Development is now to provide at least a total of 10 million people with sustainable access to modern energy services.

The defined outcomes are considered a measurable and significant contribution to the achievement of the MDGs, as energy is a key requirement to reduce poverty and to improve the standard of living and an input for economic activities and growth. Consequently, the success of the programme does not only depend on the number of people reached but also on the impact of the modern energy service provided on income, health, education and well-being.

### **B.2 Relevance of EnDev for International Energy Initiatives and the Partner Country's Development Strategy**

The overall objective of EnDev to provide access to modern energy services is shared by a number of international initiatives and partner countries strategies as described below. This highlights the relevance of energy access and of the global EnDev programme.

#### **Initiatives on international level:**

In 2012, the United Nations celebrate the International Year of **Sustainable Energy for All (SE4ALL)**. It will be a leading parameter for development cooperation actors, programs and initiatives active in the energy sector. SE4ALL will amplify awareness about the global energy challenge and will provide a platform for increased coordination and cooperation. With the first of the three objectives, to ensure universal access to modern energy services by 2030, the initiative has set ambitious targets. It implies that existing initiatives have to reinforce one another and intensify cooperation efforts. It also implies that some common understanding on what energy access means needs to be in place and a monitoring method developed/applied.

Norway launched the international **energy+** initiative in 2011. The Initiative will engage with developing countries to increase energy access and reduce energy sector emissions, by applying a result based sector level approach and leveraging private capital. Energy+ will cooperate with governments to develop commercially viable renewable energy and energy efficiency business opportunities to meet the challenge of increasing access to energy in a sustainable manner. Energy+ will thereby build upon and benefit from existing initiatives and programs.

The Africa-EU Energy Partnership (AEEP) was launched in 2010 with the commitment to bringing access to modern and sustainable energy services to at least an additional 100 million Africans by 2020.

The ACP-EU-Energy Facility (EU EF) is co-financing projects on increasing access to sustainable and affordable energy services for the poor living in rural and peri-urban areas in African, Caribbean and Pacific (ACP) countries. The current EU EF has a total budget of EUR 200 million.

The Global Alliance for Clean Cook Stoves led by the UN Foundation. The goal of the alliance is for 100 million homes in developing countries to adopt clean and efficient stoves and fuels by 2020. The alliance is part of a planned major UN initiative to achieve universal access to modern energy services by 2030. UN-Energy – a collaboration of 20 UN agencies – will lead the effort.

The World Bank Group (WBG) with several programmes for energy infrastructure development, both on- and off-grid approaches (incl. renewable energy technologies like PV, wind and hydro). One of the most prominent WBG programmes focusing on access is the Lighting Africa initiative which supports the private sector to develop, accelerate, and sustain the market for modern off-grid lighting technologies tailored to the needs of African consumers. Main activities include supporting market research; networking between international and local entrepreneurs; financing facilitation; developing standards; certification and labelling; aggregating market demand; knowledge sharing and capacity building. Other WB led programmes with strong energy access components are Asia Sustainable and Alternative Energy Program (ASTAE), the Global Partnership on Output-Based Aid (GPOBA), the **Energy Sector Management Assistance Program (ESMAP)**.

The Energy for All Initiative led by the Asian Development Bank (ADB) aims to provide access to safe, clean, affordable modern energy to an additional 100 million people in the region by 2015.

The Global Environment Facility (GEF) which provides grants to developing countries and economies in transition for energy projects related to climate change, international waters and land degradation. Global environmental protection rather than improved energy access is the primary goal of the GEF although energy is an implicit objective of the GEF.

The Global Village Energy Partnership (GVEP), a network of 2000 private sector members, developing and developed countries governments, NGOs, academia and international development agencies working to accelerate access to affordable and sustainable energy services for poverty reduction.

The Alliance for Rural Electrification (ARE), a network of private sector actors, which promotes and provides efficient renewable solutions for rural electrification in developing countries. Consisting mainly of multi-national enterprises and industry associations of the renewable energy sector, the primary mandate of ARE is to lobby for the use of renewable energy technologies for rural electrification in developing countries rather than deploying them at the operational level.

EnDev has established working partnerships with almost all of these programmes and organisations.

In preparation of the SE4ALL year the UN Secretary-General has initiated a consultation process among public sector, private sector and civil society representatives. The Secretary-

General has called for a high level group to advise on the preparatory process for the UN year. EnDev has joined the **Task Force 1 of the UN Secretary General's High Level Group** on Sustainable Energy for All. This task force has developed recommendations for country level activities within the framework of the UN initiative. The **recommendations** covered guidelines for concrete actions (in detail ideas on technology neutral approaches, host country ownership, policy and funding options, coordination across actors) a framework for inclusive engagement between governments, donors, private sector and civil society and ideas on a performance and accountability framework. As next step an action plan of the initiative shall be launched in April 2012. It is foreseen that commitments for the initiative will be announced during the conference **Rio + 20 in June 2012**.

In the European context the Energy Access work will be led by the **European Commission**. The EC has decided to support the scoping missions for pilot countries of the SE4ALL initiative. The European Commission, the World Bank and the UN will therefore organise joint missions to prepare the SE4ALL action plan. The schedule foresees to conduct these missions until April/May 2012. The EC has asked the **EU Energy Initiative Partnership Dialogue Facility (EUEI PDF)** which is hosted by GIZ to support the EC's activities in that regards. EUEI PDF will closely link up with EnDev and its experience since in many of the shortlisted countries EnDev has experience on the ground.

The concept paper for the SE4ALL initiative defines modern energy access as 'a household having reliable and affordable access to clean cooking facilities, a first connection to electricity (defined as a minimum level of electricity consumption) and an increasing level of electricity consumption over time to reach the regional average.' One of the core elements of the initiative will therefore also be to develop transparent and reliable forms of reporting and monitoring of the set targets. EnDev is working on defining practical **indicators to measure energy access** together with **the World Bank, ESMAP, UNDP, GVEP and Practical Action**. The group has developed a concept note covering the four dimensions of energy access – household electricity, cooking/heating, community energy and productive use – taking also into account the different levels of energy access – from basic level of energy access to advanced level of energy access. Based on this the group has developed a first set of indicators for households, social infrastructure and businesses. The results will be fed to the SE4ALL initiative. It is hoped that the initiative will draw upon these indicators, especially when designing indicators on the macro level. EnDev thereby brings in its broad experience with different methodologies applied, i.e. methods to include national statistics in project monitoring, account for gaps in actual benefits from energy access interventions, set up of a management system for monitoring data.

With its overall objective to provide around 10 million people in developing countries with sustainable access to modern energy services, EnDev has now a long track record of supporting in country activities on energy access. Over the past 8 years EnDev has made valuable experiences in 22 countries with a variety of technologies. As a programme concentrating on producing tangible and measurable results EnDev has learned from a variety of modes of delivery – from financing grid-extension components, supporting technology transfer between Asia and Africa, building up private sector engagement in small-scale energy systems to assisting the market development of improved cook stoves. To provide reliable data about its contribution towards the set objective EnDev developed a monitoring tool which provides accurate, reliable and transparent data with all beneficiaries

traceable. Considering this know-how the Norwegian Ministry of Foreign Affairs decided to join EnDev and to use their participation as a contribution to the energy+ and the SE4ALL initiatives

**On national level:** Many developing countries are working to extend access to modern energy services, including safe and sustainable cooking fuels, to their entire population. According to a study of UNDP and WHO 68 developing countries have defined tangible access targets.<sup>1</sup> In addition energy access is part of different national strategies and plans such as Poverty Reduction Strategies (PRSs), Green Economy Strategy, National Development plans. Thus, the EnDev programme is coherent with the national energy sector policies of the countries in which it is active.

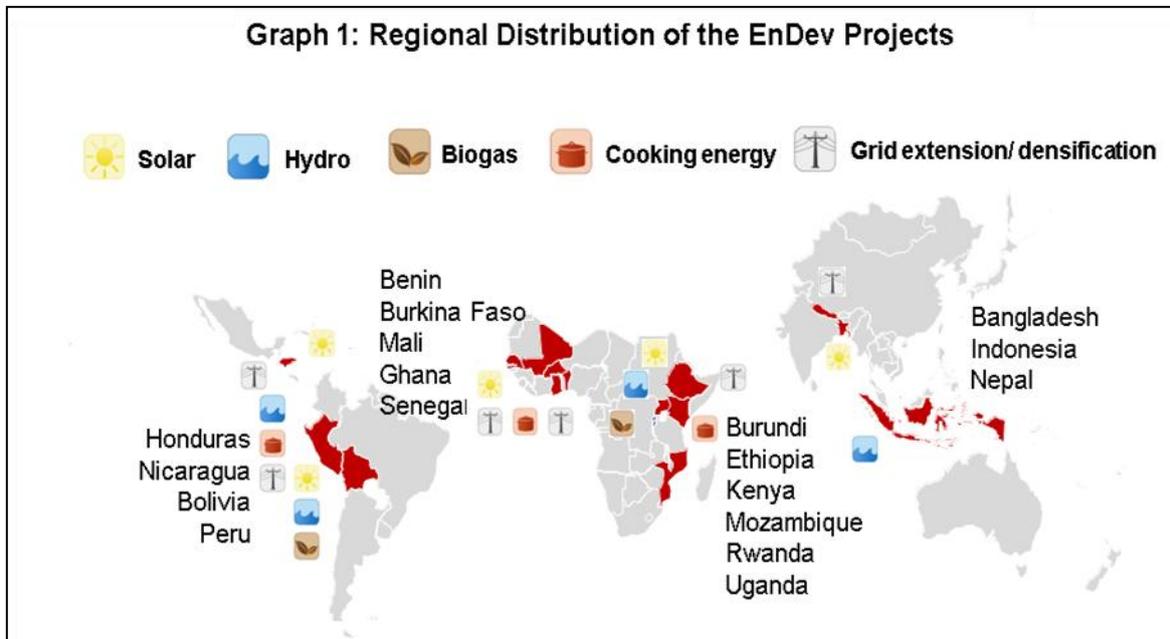
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<sup>1</sup> UNDP, and WHO. 2009. *The Energy Access Situation in Developing Countries - A Review on the Least Developed Countries and Sub-Saharan Africa*. New York.

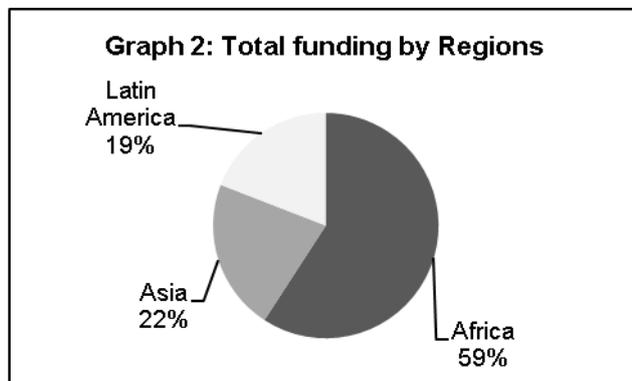
## C Achievements of EnDev 2

### C.1 Number of projects and regional distribution

In the second phase of the EnDev Partnership projects are currently carried out in 18 countries (Graph 1).



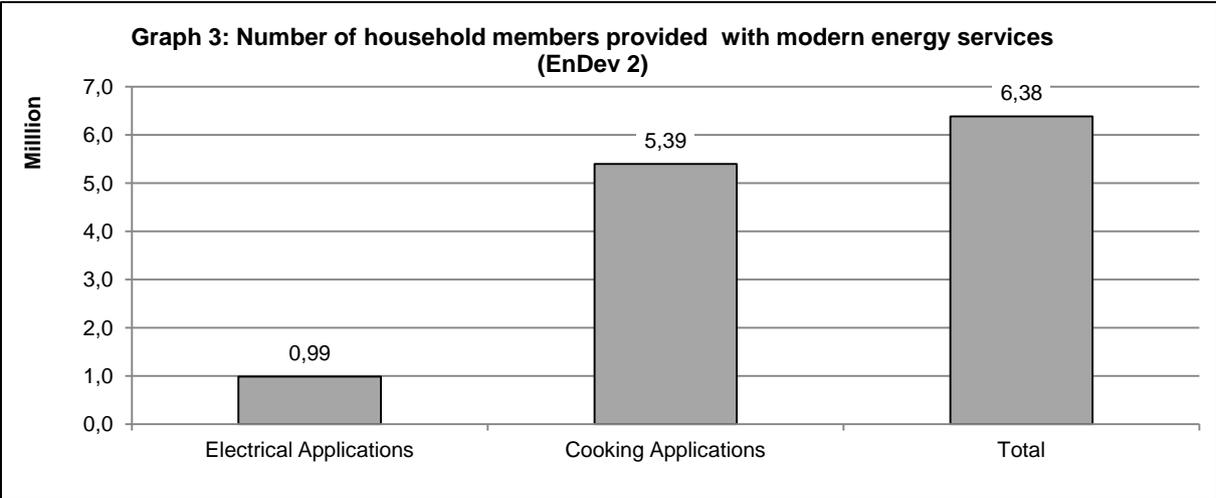
The regional focus is on Africa. Eleven out of the 18 countries where EnDev has been active belong to Africa, followed by 4 countries in Latin America and 3 countries in Asia. The focus on Africa is also reflected in the allocation of financial resources to the different regions. Out of the EUR 71 million allocated to country projects 59 per cent will be spent in Africa followed by 22 per cent in Asia and 19 per cent in Latin America (Graph 2). Three EnDev Projects in Africa (Senegal, Benin, Burkina Faso) received additional funds from the ACP-EU Energy Facility II to upscale their activities. In 2011 Irish Aid allocated EUR 500,000 to EnDev Ethiopia for the electrification of health centres with PV systems.



### C.2 Achieved number of persons

By Dec 2011, 6.38 million household members were provided either with electricity or improved cooking technologies under EnDev 2. Out of this figure, 990,000 people were connected to a grid/ mini grid or are benefiting from the installation of a Solar Home System. The remaining 5.39 million people were provided with access to improved cooking energy, when households acquired an energy efficient improved stove (see Graph 3). In addition, 4,082 social institutions got access to improved cooking energy or electricity, or other

modern energy carriers and 13,970 small and medium enterprises were provided with a modern form of energy for productive use.



When assessing the outcomes it is important to consider the sustainability of the achieved access as well as windfall gain effects and a so called double energy effect.

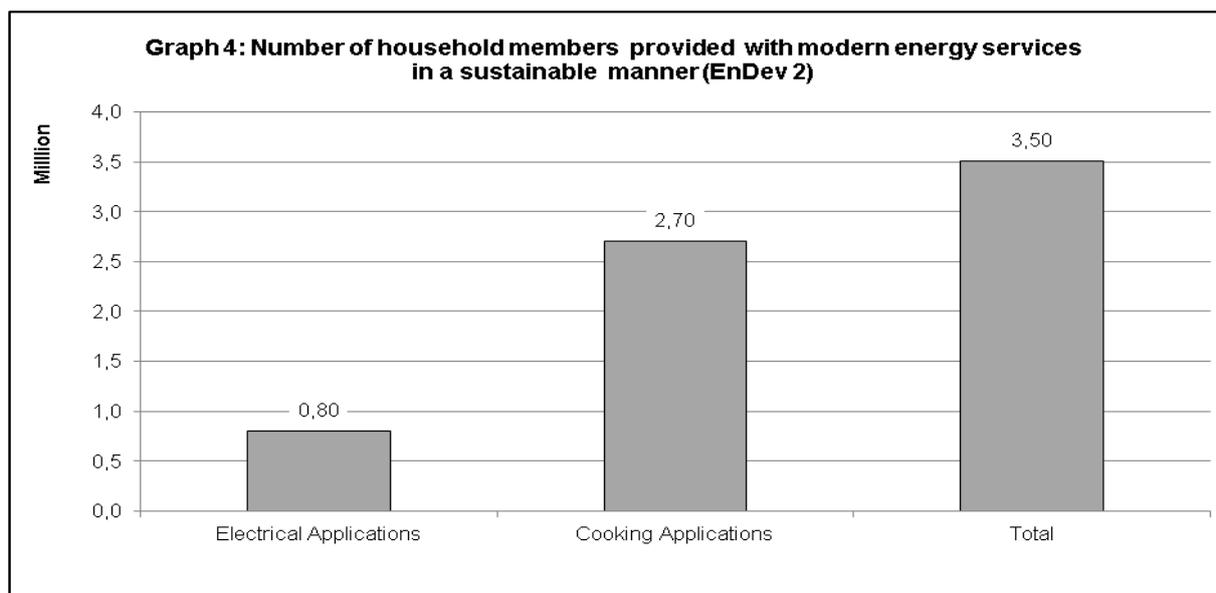
EnDev interventions are aimed at establishing or enhancing sustainable markets for affordable energy technologies, fuels and services adapted to needs of the target population. Thus, one of the key activities of EnDev projects is to train and support local manufacturers in technical and business skills. However, not all of the manufacturers trained stay in business. Especially in the case of stoves where profit margins are low up to 50% of trained stove producers stop this business after the project support ended, portraying the commercially extremely weak market structures at the bottom of the pyramid. In case of solar systems and hydropower plants households and communities may not be able or willing to maintain the service or technology for a longer period of time due to shortage of money or risk factors (e.g. disasters) which are hardly addressable by development actors. These losses of access are not easily compensated through the market forces. Consequently, the number of people having durable access to modern energy services is generally lower than the number of people who were initially provided with modern energy services. This is, in particular, the case for devices that have a short lifespan and require frequent maintenance. Depending on the technology or provided services, the attractiveness and lifespan of the devices and services a sustainability adjustment factor is applied ranging from -5% to -40%. In some cases as for grid extension and hydropower the decrease of the number of people with access to modern energy is exceeded by an increase because many people move into villages with grid electricity as they also want to benefit from the new infrastructure. Therefore, a growth adjustment factor is applied for these specific cases.

The windfall gain factor takes into account that some households benefit from support and subsidy measures of the EnDev programme, although they would have gained access to modern energy services anyway. For instance, a significant percentage of households in Bangladesh would acquire a Solar Home System even without any support from the project but of course they take advantage of the subsidy schemes provided by EnDev.

A third adjustment factor (double energy factor) is related to the fact that some households and welfare institutions which benefit from improved stove activities may already have access to electricity or to liquefied petroleum gas (LPG). This is especially the case for

households and institutions in urban and peri-urban areas. In most cases these households are poor and the improved stove contributes to improve their living conditions. However, they already have access to a modern energy service and thus are not counted.

When applying these three different adjustment factors the total number of people provided with modern energy services in a sustainable way under EnDev 2 is 3.5 million (2.7 million with stoves and 0.8 million with electricity and other modern energy carriers) (graph 4).



The total number of people who got sustainable access to modern energy services on household level in the EnDev program (phase 1 and 2) is 8.52 million.

In addition 11,583 social institutions and 25,928 small and medium size enterprises got access to electricity or modern cooking technologies.

EnDev aims at achieving a ratio of 1/3 to 2/3 between electrification and stove outcomes. Currently the share of electrified households is 25% of all benefitting households. Main reasons, why electrification is advancing relatively slow, are for example:

- Change of government policy and commitments such as reduction of public spendings for micro hydro plants
- Unattractive Power Purchase Agreements for grid connected hydro power plants
- Burocratic administrative processes for procurement of goods and licencing procedures
- Lack of investors in renewable energy technologies
- Poor quality of products (solar systems, stoves) spoiling the market
- High import taxes for renewable energy technologies

### C.3 Impacts

EnDev aims to provide people in developing countries with access to modern energy services. Combined with this outcome it is intended:

- to increase the efficiency of the use of cooking and lighting energy sources by 40% in benefitting households;
- to reduce indoor air pollution for at least 1,100,000 women and children,
- to increase the turnover of energy enterprises involved in the programme by 30%, and
- to generally improve people's living conditions.

The monitoring and reporting system currently in place for EnDev focuses on measuring the the number of people provided with modern energy services, the energy efficiency of the promoted energy technology or service, the turnover of involved companies and the reduction of green house gas emissions. In an ad-hoc and limited way, projects report on the direct benefits of having access to energy services as well, such as cost savings, improvement of health situation, better educational conditions, and opportunities for income generation.

In addition to the regular reporting, impacts of EnDev are studied through baseline studies, special impact assessments, mid-term reviews and ex-post evaluations. The findings of the studies are also used to confirm or improve the adjustment factors which are applied to the reported outcome figures. A recent study in Nicaragua, for example, found over 90% of surveyed solar home systems to be in operation, thus validates the high sustainability factor which is used for this specific country measure (deduction only by 10%).

In 2011 30 impact studies/reports were initiated. 21 of them are completed. 9 are still in progress. The studies cover electrification as well as stove projects in 13 countries. A full list of all reports is available in energypedia.

A comprehensive overview of the achieved impacts of the entire program is published in the EnDev Report on Impacts (EnDev, 2010). The report is being supplemented regularly with newly discovered impacts.

### **Increase the efficiency of the use of the primary energy source.**

In 2011 EnDev tested the efficiency of promoted stoves in 8 countries: Bangladesh, Benin, Bolivia, Ethiopia, Kenya, Peru, Senegal, and Uganda. Stoves not saving at least 40% of energy were not included in the adjusted number of outcomes. However, they are not excluded from project activities because they often have positive impacts on indoor air pollution and work load, even if they don't reach 40%.

### **Reduction of Indoor Air pollution and health impacts**

Lighting and cooking with traditional devices using solid fuels is the cause for fire accidents and indoor air pollution. Acrid smoke and deposits of soot in the lungs are responsible for more than 500,000 deaths among women around the world every year.

Improved stoves promoted by EnDev directly reduced indoor air pollution through a) saving of firewood, b) the improvement of burning process leading to reduced smoke emissions and c) by introducing chimneys for specific stove types. The new stoves have therefore enhanced indoor air quality, as well as the safety and hygiene of kitchens in the households involved.

*In Peru, where 77.4% of the rural population prepares meals over an open fire, EnDev is part of the national campaign "Half a million improved cooking stoves for a Peru without smoke". Stoves used within the campaign possess chimneys. In a recent study the vast majority of users stated a significant*

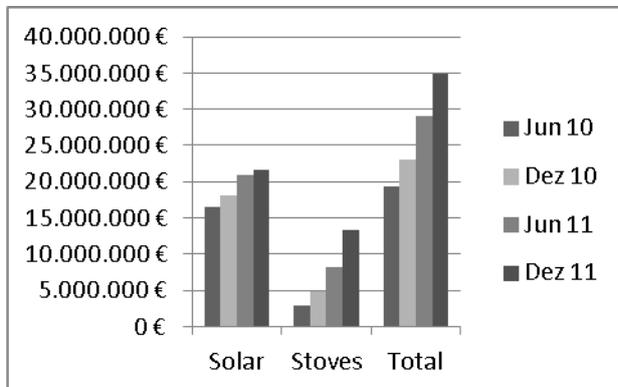
*reduction in smoke related disease (Hergt 2011).<sup>2</sup> In another study it could be demonstrated that emissions of particulate matters decrease up to 70% leading to a significant reduction of pulmonary diseases.*

Electric light replaces traditional kerosene lamps, which emit toxic gases and are one of the main causes of fire accidents. Furthermore, electric light improves people's safety while in the dark (e.g. thefts, snakes). In addition, electric power is important for any well functioning health care system because it enables clinics to refrigerate vaccines, sterilise medical equipment, provide lighting in wards and operating theatres, and make use of communication equipment.

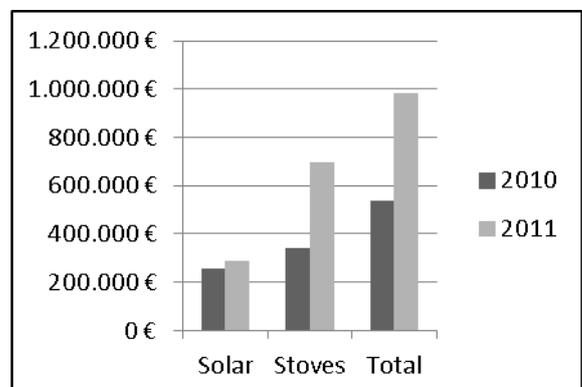
**Economic Impacts**

**Increase of the turnover of energy enterprises**

For the development of self-sustaining markets it is essential that sales figures of energy products and services reach a critical mass of customers and sufficient turnover, allowing enterprises to stay in business on medium and long term. Based on this concept calculations were carried out about the total number of sold/installed energy technologies/services and the corresponding turnover of the involved enterprises (see graph 5). According to these data, turnover of local solar companies involved in EnDev has been EUR 21 million and the turnover for stove producers EUR 13 million. The total turnover is estimated to be around EUR 34.8 million. The average monthly turnover of solar companies increased from EUR 254,000 in 2010 to EUR 287,000 in 2011, that of stove producers from EUR 340,000 to EUR 697,000. It is planned to analyze the sales and turnover data more in detail in the upcoming reporting periods and to continuously assess the market development for different products and services.



Graph 5: Accumulative turnover



Graph 6: Average monthly turnover

**Impacts on Income and Employment**

Households with an efficient cooking stove spend less on firewood than those without, so that these households can save part of their income. Households connected to the grid or benefiting from a photovoltaic system drastically reduce their expenditures for kerosene,

<sup>2</sup> To investigate health related effects in depth, EnDev together with partner institutions such as WHO or Liverpool University, is carrying out health studies in Peru and Kenya, respectively.

candles and single-use batteries. However, the overall impact on the family outlay depends on the amount of the electricity consumed.

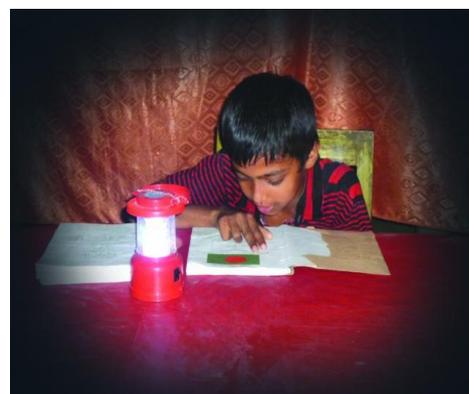
For small businesses, electrification makes a significant contribution to economic growth and poverty reduction. A bright illumination of markets and workshops helps to attract new customers. With access to electricity, businesses can diversify the service they offer and extend their working hours into the evening. However, it is very rare for new income generating activities to arise as a consequence of a new electricity supply alone.

Thus, an immediate economic development as a result of energy access is limited to affected entrepreneurship either in producing energy services or using energy for (most already existing) productive means.

On the other hand the economic development of the rural population is highly influenced by the level of education, the state of health and the general living conditions of households which are positively affected by improved cooking technologies and access to electricity.

### **Impacts on Education**

Children in rural areas, especially girls, often spend a great deal of time on basic subsistence activities, such as collecting firewood. Less wood need due to an improved cook stove reduces time for collection and increases school attendance. Although access to electricity does not have an immediate impact on educational levels, it influences learning performances by providing adequate lighting for children to spend more time studying and reading later into the evening.



*In a baseline study in Bangladesh households being electrified stated that they spent 2.26 hours on reading while no- electrified households 2.00 hours (Clean Energy Alternatives Inc. 2011).*

Electricity brings with it the possibility of gathering information through radio or television.

*Households at EnDev hydropower sites in Indonesia operate primarily lighting devices, but also TV sets and other information and entertainment devices like CD or VCD player or charge mobile phones. Ownership and use of mobile phones is significantly higher in electrified households, compared to non electrified households selected as control group. 81 % of households name TV as their major source of information (RWI 2011).*

The electrification of schools means that teachers can use computers, televisions, and tape recorders a significant contribution to the quality of the education system (sometimes critical to get/keep teachers in rural areas). In addition, adult education in the evening hours becomes possible.

### **Impacts on Gender**

Poverty among women is strongly linked to the dependence on the cheapest energy sources, such as biomass, for everyday living. In the traditional gender-specific division of labour, household activities are predominantly the duty of women. It is therefore women who are subject to the various health risks connected with cooking that are caused by indoor air pollution from traditional cooking devices and 3-stone-fire. Burdened by their household activities, women can spend less time than men in education. Their workload also reduces women's options for participating in productive activities, which condemns them to economic

dependence. EnDev is working towards the empowerment of women targeting the above-mentioned issues in all its approaches.

*The Improved Cook Stoves Project in Kenya illustrates these positive effects. Almost all respondents claim to have saved time on wood collection and cooking (time saved can reach up to twelve days a month). Half of the respondents who saved time use this additional time to carry on their productive activities. About a third of the respondents saving time were doing leisure instead (going to the church, visiting family members, etc.). Although the study did not focus on measuring changes in the actual indoor air quality, nearly all respondents estimated that the smoke produced by the ICS was less when compared to the three stone fire (Khanbabai 2011).*

In some countries women have become stove entrepreneurs, thus improving their social position, and enhancing their roles within families and villages.

Electric light gives women the freedom to do some of their housework after dark, so they have more time to relax, to study or to do other work during the day.

### **Environmental impacts**

Modern and clean energy services, with improved energy efficiency and the use of clean energy resources, contribute to the reduction of environmental degradation. Improved stoves reduce the demand for firewood. They therefore reduce deforestation, soil erosion, land degradation and desertification, and they improve water control. A further consequence of the more efficient burning and the lower demand for firewood is the reduced emission of greenhouse gasses. Compared to cooking on open fires, the improved stoves emit between half and one and half tonnes of CO<sub>2</sub> less per stove annually. The total savings for one year amount to approx. 585,000 t of CO<sub>2</sub><sup>3</sup>.

More than 955,000 tones of firewood were saved due to the introduction of energy efficient improved cook stoves. Savings of 585,000 t / CO<sub>2</sub> are as much as 325.000 medium-sized vehicle (150 g CO<sub>2</sub>/ km) driving 12,500 km a year.



Electrification through grid extension, mini hydropower plants or photovoltaic installations has helped to reduce waste problems by decreasing the demand for small throw-away batteries. Used batteries are usually discarded in the local environment as toxic waste without further treatment. Mini hydropower plants also contribute to increased awareness of environmental issues due to the importance of proper watershed management and reforestation to secure a long-term water supply.

*Reforestation with self-grown seedlings was observed in the community run MHP-project in El Naranjo, Nicaragua. The project is buying forest in the catchment basin of the river feeding the power plant. It is seen as the only chance to avoid deforestation and assure the water flow thus production of electricity, in the dry season (Diederich 2011).*

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<sup>3</sup> For the time being the CO<sub>2</sub> savings per year are only calculated for Solar Home Systems, offgrid hydropower, PicoPV and improved cook stoves of EnDev 1 and EnDev 2, which were present in June 2011. The calculation is according to UNFCCC based on default values and were necessary own assumptions.

- a household provided with electricity saves fuel of 2 kerosene lanterns (0.15 t / CO<sub>2</sub> per year)
- a household with an improved cook stove saves 0.54 t / CO<sub>2</sub> per year

Within EnDev the adjusted outcome figures are used to calculate the CO<sub>2</sub> 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 stoves contribute to CO<sub>2</sub> reduction.

Photovoltaic installations, such as solar home systems, do contribute to environmental sustainability by decreasing the demand for kerosene and gasoline. However, special attention must be paid to the proper disposal of the solar batteries, a process which is still in its infancy in many project regions.

#### Impacts on information and knowledge exchange

In 2010, EnDev launched “energypedia” an internet platform similar to Wikipedia, providing articles about renewable energies and experiences in the context of development cooperation. Unlike conventional web-platforms, “energypedia” allows all its users to make their contributions by providing and revising knowledge due to the fact that it is not organized in responsibilities or hierarchies. Since September 2011, all web users are able to browse through energypedia without prior registration. “Energypedia” currently comprises 720 articles and connects more than 1,750 energy experts, development workers, and students from all around the world.

Energypedia is not a static platform but kept developing with new features. In 2011, energypedia's design and portal structure was reworked. In a first database application has been installed in form of the PicoPV Database encompassing a probably unique collection of more than 90 systems. Furthermore the “Total Energy Wiki” (within energypedia) was set up in cooperation with the Practical Action as an online data collection system enabling people and organizations to participate in and contribute to collecting data on energy access in a new way. It is a grassroots, crowd-sourced way of collecting data which could complement existing data collection systems, and provide a broader picture of how energy services are made available to and used by poor people.

A concept was developed to establish energypedia as an independent non-profit organisation to enable a long term sustainability of the platform. The non-profit organisation shall be responsible for the operation and continuous development of [www.energypedia.info](http://www.energypedia.info) from March 2012 onwards. The change of the ownership will not affect the use of the platform. Energypedia will remain an open and free knowledge platform for sharing information about renewable energies. The outsourcing of [www.energypedia.info](http://www.energypedia.info) to an independent organization is considered a necessary step as a program like EnDev has not the possibility to ensure a longlasting operation of such a platform.

In the near future, an additional energypedia consultancy will be founded offering commercial services like customer-specific wiki solutions and trainings. All potential profits will be transferred to the existing non-profit organization allowing a more independent financing. The overall goal of all these organizational changes is the sustainable build-up of stable structures and a smooth operation of [www.energypedia.info](http://www.energypedia.info) to exchange knowledge regarding renewable energies in the context of development cooperation.

## D Country activities

### Benin stoves

<b>Promoted Technology</b>	Stoves			
<b>Project Budget</b>	2,000,000	<b>Spent until reporting date</b>	892,585	
<b>Project Period</b>	01.2010 – 12.2013	<b>Reporting Period</b>	12– 2011	
<b>Lead Executing Agency</b>	Ministry of Agriculture			
<b>Implementing Partner</b>	Ministry of Energy			
<b>Involved Bilateral / Multilateral Programmes</b>	ProAgri Promotion de l'Agriculture; PANA (UNDP), PFSE (WB) ; stove related projects of Agence Walonne de l'Air et du Climat, the French NGO Tech-Dev through the Fonds Afrique; World Food Program			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	0	0	0	people
Cooking Energy for Households	400,000	65,817	137.263	people
Electricity and/or Cooking Energy for social infrastructure	0	29	21	institutions
Energy for productive use/ income generation	0	176	131	SMEs

### Project strategy and key components

In the first phase, EnDev promoted a variety of efficient cook stoves in a rural area in the North-West of Benin. Commercial supply-demand systems without direct subsidies have been developed. Although successful, at the end of the first phase there were still some weaknesses concerning the quality of the stoves and the sustainability of the market to be addressed.

These issues are taken-up in the first component of the current second phase. Activities to improve stove quality as well as production capacities particularly for charcoal stoves are in the centre of component 1.

The extension of the program interventions beyond the North-West are the focus of a second component. Particularly the urban centres in the South have been selected as an interesting additional market for improved cook stoves. Additionally, another area in the North-East has been selected for an extension of the work in rural areas based on the implementation concept developed in the North-West.

### Project progress (overall progress towards outcome target EnDev 2)

Results of Endev2 have more than doubled as compared to the last reporting period. Compared to the overall target this represents 34%. At the same time, 45% of the overall funds have been spent. Based on scenario calculation, there is a good chance to reach the target until December 2013.

#### Component 1:

Stove sales have increased by 30% as compared to the same period a year ago. Ceramic stoves with and without metallic liners have shown a remarkable growth. This is largely an effect of the investments into mechanised production centres at the onset of the second phase of FABEN. Marketing campaigns continue to stimulate more demand.

Component 2: The activities in the South and North-East have started in July and August 2011 with technical trainings of a total of 225 producers of metal, ceramic and mud household stoves. Since then, more than 10,000 stoves were sold in the South and the first 4.000 stove sales were reported for the new implementation area for the North-East. Considering that both results were only achieved within 3-4 months, there is a high potential for a strong up-take in 2012.

The new charcoal stove for Benin has been successfully adjusted to the fuel quality in Benin. Lab-test and user feedback confirmed its suitability and conformity with the EnDev quality standards even against the improved baseline stove in the South. Early 2012 the design will be fine-tuned for mass production. The first stoves will be produced and sold within the first half of 2012.

### **Sustainability and handover strategy**

Component 1: In the North-West, a robust market of ICS seems to have been established. As part of a phasing out strategy, focus has been given to quality assurance activity (e.g. standardisation of production).

An important observation on sustainability can be made on the ICS for Social Infrastructure and Productive Use. In the second phase, no targets have been set for these large scale stoves, and the support of the program to these products has been withdrawn. However, even 2 years after the start of the new phase, the sales within the first 2 years of EnDev2 were higher than the final result reported at the end of EndeDev1. This confirms the sustainability of the market of these products (though on a rather small scale in absolute numbers).

Component 2: Activities in the South and the North-East have just started.

**Benin rural electrification**

<b>Promoted Technology</b>	Grid			
<b>Project Budget (in EUR)</b>	1,600,000	<b>Spent until reporting date</b>	1,609,000	
<b>Project Period</b>	10.2009 – 12.2012	<b>Reporting Period</b>	12– 2011	
<b>Lead Executing Agency</b>	Ministry of Energy			
<b>Implementing Partner</b>	Societe Beninoise d'Electricite et d'Eau (SBEE), local communities, Agence Béninoise pour l'Electrification Rurale et la Maitrise de l'Energie (ABERME), Consortium CERABE/DERANA-ONGs (NGO)			
<b>Involved Bilateral / Multilateral Programmes</b>	BMZ-GTZ Decentralization Programme & BMZ GTZ Water Programme, EU-Energy Facility, Agence Francaise de Développement (AFD)			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	15,399	8,518	8,519	people
Cooking Energy for Households	-	-	-	people
Electricity and/or Cooking Energy for social infrastructure	79	68	68	institutions
Energy for productive use/ income generation	37	53	53	SMEs

**Project strategy and key components**

EnDev RE Benin targets grid extension and densification through a cooperation with the national utility SBEE. The project introduced adequate structures for tariff collection (pre-paid meters, group connections) and downsizing of technical standards to fit rural electricity use circumstances, and contributes to investment financing. It is supporting SBEE in the tendering process for the concessions of grid extensions to local electricity supply companies. Next to that the project aims to develop non-grid power supply options through the rural energy agency ABERME. Under EnDev1, fully financed by EnDev, 12 villages were electrified. EnDev2, a EUR 21,8 mio basket financing project of EnDev (lead implementer, EUR 2,4 mio), EU Energy Facility (EUR 7,7 mio), ADF (EUR 7,8 mio) BMZ (EUR 1,5 mio) and GoB (EUR 2,4 mio), aims to electrify an additional number of 105 villages (redesigned within the budget from 59), and also includes a renewable energy off-grid component.

**Project progress (overall progress towards outcome target EnDev 2)**

No connection has been accomplished under the EnDev2 "Energy Facility" component yet, in spite of earlier planning and expectations to finish construction and start connecting households (current progress numbers are results from the EnDev1 activities but realized under EnDev2). Main reasons are difficult and time-consuming tendering procedures and subsequent delays in procurement of required materials and equipment, the departure of the team leader/project manager in June 2011 and difficulties in finding a qualified successor, and loss of poles (as was already experienced in EnDev1 the critical element in the project) by fire accidents. However, meanwhile the project is underway and construction works on site have started in January 2012.

EnDev budget has been spent preferentially because of the earliest deadline in the funding basket. From now on resources will be fully drawn from the other contracted funds but outcomes will be -as agreed- proportionally shared over the whole basket.

Finally a new project manager has arrived and started early 2012. It is therefore expected that good progress can be made early 2012. Also the status of EnDev1 villages including the assessment of the number of new customers (earlier indicated by SBEE but not supported by data) will be verified. Next the opportunities for restarting the off grid RE component with ABERME will be assessed.

Because of the unexpected delays suffered and the fact that customer connection will occur only after construction works are completed it might be necessary to extend the project (in line with the current EU final date) cost neutral until 07.2013, also to monitor and count the household connections that will only be realized after extension of the grid.

### **Sustainability and handover strategy**

Preparatory measures by NGO's , done well before electrification under EnDev1, proved their value in getting higher connection densities and customer understanding, thereby improving the chances of sustainability. Since EnDev1 SBEE did not report any disconnections which carefully indicates sustainability, too. This however will be verified. Meanwhile for phase 2 the same approach is chosen. NGO's start their work, unfortunately a little delayed because of contracting procedures, at the soonest.

Sustainability can also be supported anecdotally: The project has increased significantly the mobilization of the target group: villagers increasingly demand SBEE officials for being connected to the grid in the near future and villages already connected demand for an additional grid extension. New businesses and start-ups have been developed in the villages. For example, in the village of Kansoukpa, newly electrified by EnDev1, a woman who previously worked in Cotonou returned to her native village in order to establish a new business center (computer, photocopy). As a result, her income has increased significantly because of the high demand for office services which could not be satisfied previously. In the village of Toucountouna, a sawmill has been installed; in Kolonkondé, a fishmonger's and an ice production were established. A survey will be performed in the 12 villages of the EnDev1 project in spring 2012 to appraise the impacts of the electrification upon the socio-economic framework compared to the baseline survey carried out just before the villages were connected.

## Burkina Faso

<b>Promoted Technology</b>	Stoves			
<b>Project Budget</b>	1,500,000	<b>Spent until reporting date</b>	€ 970,215	
<b>Project Period</b>	05.2009 – 12.2012	<b>Reporting Period</b>	12 – 2011	
<b>Lead Executing Agency</b>	Ministry of Environment			
<b>Implementing Partner</b>	Government institutions, business associations, NGOs, IRSAT			
<b>Involved Bilateral / Multilateral Programmes</b>	Decentralization and Communal Development (DE); PASE-WB; CILLS-SNV (NL);			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	0	0	0	people
Cooking Energy for Households	300,000	217,170	288,905	people
Electricity and/or Cooking Energy for social infrastructure	450	224	471	institutions
Energy for productive use/ income generation	4,500	1,484	1,632	SMEs

### Project strategy and key components

The object of ENDEV-BF is to establish a commercially viable supply-demand system for improved cook stoves in Burkina Faso on national level. To achieve this purpose ENDEV-BF chose a regional stepwise approach. Starting in the capital Ouagadougou, it has expanded its activities first to Bobo. Under Endev2, the focus then shifted to small towns and rural areas. Next to household stoves, other key components are large scale stoves for schools and restaurants as well as special cooking devices for beer brewing and shea butter processing.

Key elements of the intervention strategy are the training of producers, the support of producers associations (for quality control, lobby work and marketing activities), awareness campaigns (e.g. on TV), product development, mobilization of government initiatives (e.g. for ICS in school canteens).

### Project progress (overall progress towards outcome target EnDev 2)

The overall targets of ENDEV-BF have already mostly been achieved, thanks to a considerable increase since 2010. This increase was stronger in the 1st semester of 2011, but also the second semester was 18% stronger than the year before. The main growth has been realised in rural areas. The investments into capacity development and public awareness are now paying off. The promotion of ceramic stoves has just started after problems with the kiln technology have been overcome.

While the overall sales of large stoves for social institutions and productive use have increased a lot, it has been found difficult to find out how many have been sold to schools or SMEs respectively as they are the same stoves of the same producers. Lobbying activities have been increased during reporting period especially for the equipment of school canteens. The impacts of these activities are expected to be seen in the next reporting period. The beer brewing stove production has been handicapped during the rainy season, in addition problems within the beer brewers' association in Bobo Dioulasso have hampered the dissemination of the stoves in this town. The stoves for the processing of shea butter were put on hold until the release of the technology. By the end of the reporting period the

tests have been repeated in laboratory and the stoves are now ready for dissemination in the first semester of 2012.

As ENDEV-BF is progressing fast towards achieving its target, a substantial top-up funding should be considered for the second half of 2012.

### **Sustainability and handover strategy**

In Ouagadougou, results have slightly decreased over the past 2 years. This is the logical result of the project having withdrawn from Ouagadougou step by step – after which production levels are now settling at a slightly lower level than with all attention from the project. The producer association is now considered strong enough to fulfil its tasks independently and has assumed further responsibility for the implementation of marketing campaigns. The sustainability of the achievements in Ouagadougou shall be investigated in the first half of 2012.

Similarly, handover processes for Bobo and the other new areas will be initiated depending on the funding situation. The promotion of ceramic stoves as well as the beer brewing stoves still requires a lot of follow-up to ensure that all technical difficulties have been overcome.

**Burundi**

<b>Promoted Technology</b>	Solar, Stoves			
<b>Project Budget</b>	900,000	<b>Spent until reporting date</b>	236,548 €	
<b>Project Period</b>	09.2009 – 08.2012	<b>Reporting Period</b>	07/2011 - 12/2011	
<b>Lead Executing Agency</b>	Ministry of Energy and Mines (MEM)			
<b>Implementing Partner</b>	DGHER - General Directorate of Water and Rural Energies IFDC - International Fertilization and Development Committee via Catalyst SEW Project			
<b>Involved Bilateral / Multilateral Programmes</b>	GIZ Decentralization and Poverty Reduction project (Appui à la Décentralisation et à la Lutte contre la Pauvreté - ADLP)			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	11.000	38	38	people
Cooking Energy for Households	-	-		people
Electricity and/or Cooking Energy for social infrastructure	12	-		institutions
Energy for productive use/ income generation	30	-		SMEs

**Project strategy and key components**

EnDev Burundi puts its focus on promotion of PV systems for households, SMEs and social institutions, ranging from Pico PV lanterns up to systems for offices. The project supports capacity development on communal basis and in the private sector. It is implemented in close cooperation with the GIZ Decentralization and Poverty Reduction project (ADLP).

Since the 1st year yielded only marginal results, strategies for the different components were reviewed and have been adjusted:

EnDev Burundi will work on strengthening the entire supply chain for quality Pico PV Systems, starting by cooperation with local importing companies and subsequently expanding this to the end user. Therefore 2 new approaches will be piloted, targeting existing PV importers and non PV importers. EnDev will specifically establish the link between the importers and the sales structure outside the capital. Technical trainings for dealers and user awareness campaigns will enable the market players to offer, and demand, quality products, and users to properly handle the systems.

The Battery Charging Station (BCS) component is still under revision, the user's perspective has to be fully understood, based on an analysis of a recent field survey. Potential owners and operators of BCSs raised concerns about their 50% financial contribution. An increase of the EnDev subsidy is under discussion. The end user's low purchase power versus the high investment into quality equipment is also under consideration. A final decision on how to proceed with the BCS approach had still not been taken by December 2011.

To increase the potential customer base, EnDev Burundi will extend the interventions to the province of Mwaro, in parallel to the GIZ program ADLP. The population in Mwaro province has reputedly a more entrepreneurial attitude than in Gitega province and it's expected that the commercial approach of EnDev Burundi can be boosted in this way. By increasing the number of eligible candidates (municipalities) and thus the competition between them for receiving EnDev subsidy for electrification of social infrastructure, the project expects the financial contribution to be paid faster, leading to faster implementation.

The EnDev technologies and solutions will be handled as regular important topic within the ADLP programme from start of 2012 onwards. Thus every activity, meeting and training on local and provincial level supported by ADLP will be used to advertise energy products and services, thus increasing awareness.

As a side activity to promotion of PV, there is cooperation through knowledge exchange and joint activities with biomass stove NGOs (IFDC) in Burundi, and knowledge management and -exchange with the Partner (DGHER) and other players in East Africa on micro hydro power (MHP).

### **Project progress (overall progress towards outcome target EnDev 2)**

In terms of targets achieved there's no change since the last monitoring report. EnDev Burundi is implemented by a small team (1 person as team leader and technical advisor, "0.2 person" as organisational advisor and 2 field support staff). Progress during the last reporting period was seriously slowed down by the fact that the team leader/technical advisor was on unforeseen leave for 3 months. Prior to this period the team leader could only work part time for 3 month and after that another 3 month with reduced productivity. The part time absence of key staff was not predictable. From human resource management perspective and in administrative terms a temporary replacement could not be justified. Activities and strategy adjustment were clearly influence by this shortage of staff and are now being picked up again. At present the team is complete again and working at full power.

#### Household electricity, Pico PV, SHS

Promotion of Pico PV systems through road shows was not successful. An acceptance test was done with the so called "development committees" in the municipalities to understand reasons for this. The analysis is not yet completed. First results show that most of the 18 test persons were not satisfied with the lamps, indicating that "the light is not bright enough", "the time of lighting decreases over time", "some phone chargers did not work" and several complete fall-outs are reported by the users. However, their statements reflect not necessarily real deficiencies of the quality of the product and of the service supplied, but also an insufficient understanding and a lack of skills of users when operating the technology. One lamp was appreciated during the test, but is not produced anymore (Solata d.light). EnDev Burundi will henceforth exclude all lanterns that do not meet the quality standards of the Lighting Africa Initiative, even while that implies excluding some previously selected products of sufficient quality. In general people still think prices are far too high.

The feedback indicates there is a clear demand for electricity amongst the households, but that the service provided by a Pico PV System is limited / insufficient. The low operation skills of the testers contributed to the negative feedback about the systems.

For 2012 it is planned to get other models imported by local importers. This might be done through local financing contracts with local traders and cooperation with MFIs. The project will support the linkages between importers, wholesalers and the final sales persons.

User awareness will be increased to enable them to use and judge the systems with good knowledge about properties and service -possibilities. Development of further marketing materials like fact sheets, awareness raising through field staff, continuation of road shows and advertising through ADLP activities will be part of the future activities.

#### Energy for social infrastructure

During 2011 new national obligations and municipal investment priorities were decided upon at the national level. As it was decided that municipalities should invest in new schools and health centres, the remaining communal budget was insufficient to fulfil all priorities planned for 2011, generally including the ability to pay a financial contribution for electrification through PV systems. This process was beyond EnDev's sphere of influence. Still, the project continues with sensitisation towards modern energy. Additionally, ADLP supports municipalities to increase their communal income, hoping to create new investment opportunities for them that could be used also for EnDev supported technologies.

EnDev Burundi plans to expand the intervention zone to the 6 municipalities of the region of Mwaro (between Bujumbura and Gitega) as mentioned above.

Another challenge is the competition from other electrification projects that do not ask a financial contribution and install 100% subsidised PV systems. Often such systems are of poor quality, too. Both factors reduce the willingness amongst the SIs to pay for EnDev installations. Late 2011 an energy sector working group was started in Burundi, chaired by the Minister of Energy and Mines. So far only coordination about large power systems has been discussed. Renewable Energy, especially for rural electrification had low priority during the first two meetings. EnDev will continue to lobby for RE within this group to improve coordination in the sector.

Furthermore some administrators still don't trust PV systems as most examples in the past failed due to inadequate installation and dimensioning. EnDev plans to counteract this mistrust by pointing out the quality of the first EnDev installation and the related user satisfaction. Three PV systems are about to be installed. These will serve as demonstration centres. It is planned to visit these sites with administrators of other municipalities once installed.

#### Battery Charging Stations/ SMEs

Systems have been procured but potential owner and operators have difficulties to contribute 50% of the investment. The project is currently assessing if the EnDev contribution should be increased.

It is planned to present business plans to Microfinance institutions to facilitate credit lines for battery charging systems, solar kits for hair salons and other income generating activities.

Until June 2012 pilot BCSs will be installed and their results analysed to get proper feedback from the market on constraints, pricing and demand. In shaping this part of the programme, lessons learned in the BCS programme in Mali that has been running for a few years now will be used.

#### Stoves (in collaboration with IFDC)

The results of the stove test in collaboration with CREEC at Makerere University are now available (see link below).

A stakeholder analysis including a household survey is ongoing and will be finalized towards the end of April. The introduction of moulds for standardization of stoves and to increase production capacity is in a test phase. Said moulds are copies from Kenya and Senegal. IFDC financed some sheds to have more space to dry the inserts and to stock production.

2 stove producers adapted their design (similar to Ugastove and UHAI Stove) according to the individual trainings based on the stove test results, experiences of networking of IFDC with international experts (Senegal, Kenya, Ethiopia) and the stakeholder Analysis. These are not yet available on a large scale.

In general the merging of GIZ institutional experience with IFDCs structure on site turns out to be fruitful.

#### Promotion of MHP

No activities on promotion of MHP this reporting period, emphasis on other technologies.

### **Sustainability and handover strategy**

EnDev Burundi works towards achieving 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 in order to keep installations operational over the lifespan.

The Department of Rural Energy in the DGHER and the grid maintenance team of the utility are eager to cooperate on training and maintenance of solar systems, especially those

mounted on social infrastructure to strengthen their capacity. The technicians of DGHER as well as private operators will be integrated in the maintenance structure.

Network building is done between actors such as solar companies in Burundi, shop keepers and a pool of technicians, suppliers of quality solar products, municipalities, provincial health and education departments.

To ensure that BCSs are viable they will be integrated in existing shops. The shop keepers do not only depend on the income generated by charging batteries since they also offer other goods but they will furthermore diversify their income sources. Also smaller BCSs will be promoted that can be taken inside the shop after sunset.

Considering Pico PV lamps it was planned not to subsidise lamps to prevent market distortions. However, the project now considers to subsidise the customer price to a certain extend for a test phase. It seems necessary to increase the acceptance of the lamps for the introduction and to convince the potential customers of the economical and social advantages of this technology.

EnDev Burundi will also support municipalities to get access to the communal investment fund (FONIC) to be able to invest in electrification in the future.

Since this semester the partners of EnDev Burundi on national level were always present in monitoring and evaluation meetings. More ownership is taken over on national level as compared to the start of the project.

The association to promote solar energy in the province of Gitega founded by the solar technicians trained in June 2011 will be continuously supported and implicated in all EnDev activities. There was also a follow up of the technicians' knowledge on solar energy installation and maintenance.

### **Further Information**

In order to implement the strategy changes and to achieve the results EnDev Burundi suggests extending the project duration on a cost neutral basis until the end of June 2013.

It is planned that a technical assistant will be recruited and financed by the BMZ fund for studies and human resources (Studien- und Fachkräftefond/SFF). This technical assistant will be integrated in the EnDev Team and EnDev activities.

Stove test results: [https://energypedia.info/index.php/Stove\\_test\\_results\\_EnDev\\_Burundi](https://energypedia.info/index.php/Stove_test_results_EnDev_Burundi)

## Ethiopia

<b>Promoted Technology</b>	Solar, Stoves, Hydro			
<b>Project Budget</b>	6,830,000 <sup>4</sup>	<b>Spent until reporting date</b>	6,531,000	
<b>Project Period</b>	01/2010 – 06/2012	<b>Reporting Period</b>	12-2011	
<b>Lead Executing Agency</b>	Ministry of Water and Energy (MWE)			
<b>Implementing Partner</b>	Ministry of Water and Energy (MWE) 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.			
<b>Involved Bilateral / Multilateral Programmes</b>	<b>Germany:</b> Sustainable Land Management (SLM) Program; Engineering Capacity Building Program (ecbp), Urban Governance & Decentralisation Program (UGDP); <b>Netherlands:</b> SNV Biogas Programme; Horn of Africa Regional Environmental Centre (HoA-REC); <b>Norway:</b> Energy +; <b>Irish Aid:</b> Health care programme; <b>Worldbank:</b> Energy Access and Electricity Access (Rural) Expansion; Lighting Africa; Global Partnership on Output Based Aid (GPOA); <b>Climate Investment Fund (CIF):</b> Scaling Up Renewablöe Energy Programme (SREP)-Ethiopia Investment Plan			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	25,000	96	947	people
Cooking Energy for Households	500,000	256,698	314,323	people
Electricity and/or Cooking Energy for social infrastructure	361	107	194	institutions
Energy for productive use/ income generation	60	325	560	SMEs

## Project strategy and key components

Stove component: EnDev Ethiopia is supporting the development of a commercial stove sector by improving the technical and business skills of private stove producers and by strengthening the demand side of the market. The following key (K) interventions are carried out to achieve the targeted objective: K-1 Raising awareness by employing various promotion and marketing activities to create sustainable markets, K-2 Establishing a network of stove and clay liner production micro enterprises (especially in decentralised areas) for sustainable supply of improved stoves, K-3 Enhancement of biomass fuel supply through support for firewood planting, K-4 M & E of component activities; and K-5: working on supporting interventions (studies, product development, performance testing of stoves, and

<sup>4</sup> The total budget indicated in the last progress report amounted to 6,000,000 EUR. Due to leftover of 830,000 EUR from the EnDev 1 budget for Ethiopia the total budget increased.

assisting the government and other stakeholders in policy and strategy issues and in providing training).

EnDev Ethiopia continuously monitors the ongoing interventions, oversees the existing strategies and works on identifying alternative approaches through consulting the pertinent government and non-government institutions with the objective of sustaining the stove business and creating more actors in the promotion and dissemination of stoves. Moreover stove producers are supported to establish a network with different development partners.

Hydropower component: The main approach of the hydropower component was to pave the ground for a micro hydro sector able to explore the huge micro hydro power potential of the country. For this purpose EnDev intended to establish a network of hydro scouts that are able to identify and assess suitable sites, to train turbine manufacturers in producing high quality turbines for the local market, to facilitate investments into micro hydro power and to train operators (communities, private operators) in proper management of the power plants and mini grid.

Additional to the current MHP development focussing on 10-100kW, it has recently been planned to promote a model on up-grading traditional watermills to electricity generating systems (1-15kW) with a cost efficient approach.

Solar Energy: Main strategies of the solar energy component are to promote sales of PicoPV systems through solar companies and start-ups and to establish solar kiosks offering battery charging and other services. In addition the solar component continued to provide PV systems for health and community centres.

Policy component: According to the original planning the project implementation was supposed to also include eventual assistance to the government on policy and strategy issues, as only minor side activity. However as the project went on, the Ethiopian government increasingly appreciated the project's capacity as centre of information and requested a more active role with regard to providing advice at policy level. Following the wish of the Ethiopian Ministry of Energy (and the Minister personally), the project decided to establish a policy advice unit providing comprehensive consultancy services to the government. The focus of the activities should be on

- a) Supporting the elaboration of an Energy Sector Mapping and Database Development Study (ESMAD).
- b) Strategic advice on the creation of favourable frame conditions for investments in the energy sector, such as feed-in-tariffs for renewable energies and tax exemptions.
- c) Active participation in donor coordination, harmonization of approaches and enhancing ownership and alignment. The donors interest in supporting the energy sector in Ethiopia has been growing and many of the actors, among them also BMZ, considered to make energy a focal area of their cooperation. Due to its early engagement in the energy sector, EnDev Ethiopia is considered an important source of knowledge and experiences in that field. This leads increasingly to requests both from the side of the government as well as from other international stakeholders asking the project to strategize and streamline the international energy activities in Ethiopia, in order to avoid duplication of investment.

## **Project progress (overall progress towards outcome target EnDev 2)**

Stove component: EnDev Ethiopia is promoting the Mirt (Injera Baking Stoves), Tikikil (Household Rocket Stoves) and Institutional Rocket Stoves (IRS) and has recently also introduced the new Injera stove model "Addis" (in all project regions) as well as the Chimneyed Institutional Rocket Stove (CIRS) and Deluxe Tikikil Stoves<sup>5</sup> (only in Addis Ababa).

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<sup>5</sup> Deluxe Tikikil Stoves made from sheet metal, having a higher lifespan of up to 4 years and are non-corroding. They are meant to mainly be provided to institutions.

Between July and December, 2011 31,204 Mirt stoves have been sold for household purposes by private stove producers. As Mirt stoves are only used for preparing the typical Ethiopian flat bread but not for other meals households are only counted by 50%. Consequently, the total number of beneficiaries out of that activity is 78,010 people. Similarly, households receiving Tikikil stoves (that are used for any other cooked meals) are also only counted by 50%. 14,066 Tikikil stoves have been sold from which hence 35,165 people benefit. It was possible to sell more Tikikil stoves than expected, however it has to be noted that a major share of these stoves were sold for refugee camps. In addition, EnDev disseminated 97 Mirt stoves and 341 Institutional Rocket Stoves (IRS) to social institutions. 472 stoves were sold for productive use purposes.

With regard to the sales rate of Mirt stoves a 10% decrease is observed compared to last reporting period. This is still considered to be within the normal range of fluctuation, since experience shows that households have more capital to invest in the beginning of the year, when income is higher due to harvest season. The distribution of Mirt stoves, previously focusing on urban areas, has now also shifted to rural regions, i.e. 52% distribution in rural and 48% in the urban areas. For other types of stoves, the urban distribution is still significantly dominant.

The following activities were done to strengthen and increase the involvement of the private stove producers in the different regions of Ethiopia. Major activities are the following:

- Training Mirt producers in Daga, Dek and Lake Tana as well as a women's association in Kebele on technical and business issues.
- Training 4 Mirt producers on manufacturing the new Addis stove for piloting.
- Introduction of new technologies like extruder, manual soil crushing tool & improved bonfire kiln among producers in order to scale up clay liner production of local potteries, both in quality & quantity.
- Training Ethiopia Amhara energy advisors and energy experts at Woreda and regional level on clay firing kiln construction with the objective to construct a Better Bonfire Kiln for women groups engaged in pottery activities.
- Training experts and producers/builders at regional level with the objective of enhancing the conceptual and practical knowledge of participants in the area of household rocket stove production, Addis stove production and installation, as well as bread baking oven construction, Awramba stove building and Briquette production.
- Training 10 household rocket stove producers as well as 7 experts, mainly drawn from energy offices, on technical issues.
- Refreshment training for 9 producers, 1 energy expert from EMRDPA and one officer from Gondar University, to further upgrade skills and share experience in design and manufacturing of IRS producers.
- Introduction of techniques on the production of Chimneyed IRS and Deluxe Tikikil Stoves.
- An acceptability assessment for Tikikil stoves was conducted in rural contexts. For the acceptability test, sample rural households were mainly selected at micro hydro power development sites, as an attempt to combine the project's bio energy and the hydro activity.

Different promotion and marketing activities were carried out in this reporting period among different target groups to raise the awareness with regard to the benefit from using improved stoves:

- Conduction of 20 public stove demonstrations
- Participation in 13 trade fairs and exhibitions
- Broadcasting of 180 radio and 50 TV advertisements

- Distribution of promotional material (such as 48,000 leaflets and 5,500 posters etc.)

In relation to promotion of renewable energy technologies, two informal discussion platforms have been created in two regions of Ethiopia, leading to information exchange and networking in the Ethiopian energy sector (both national and international). These platforms are:

- the “Talk Energy Ahead (TEA)” forum in Addis Ababa (with in average 80 to 100 participants meeting once a month) and
- the “People and Energy Network (PEN)” in Amhara.

Despite these efforts it has to be noticed that distribution figures for stoves have to date not met the planned objectives. This is mainly due to the fact that the market in the regions where EnDev Ethiopia has been engaged over the last years seems to become saturated. The number of households that have not yet purchased improved cook stoves, significantly decreased. Thus, a significant number of sold stoves is supposed to replace already existing stoves. Those households who buy new stoves as replacement for earlier purchases are not reflected in the counting figures. EnDev will analyze in the next reporting period to which extent replacing of old stoves really takes place or whether old stoves are used longer than expected. In this case outcomes would increase as a higher share of sold stoves would go to new customers.

EnDev Ethiopia has also started to extend project activities to new distribution areas. Quick high outcome numbers cannot be expected here as production and marketing structures in those regions have to be built up, before dissemination can start in large scale. It is though expected that the stove distribution figures will soon increase again.

Hydropower Unit: Installations of 4 MHPs (Gobecho I, 7 kW; Gobecho II, 34 kW; Ererte, 33 kW; and Hagara Sodicha, 58 kW) are completed and commissioned, besides small adjustments in early operation. Some connection numbers are not reported in the monitoring sheets but will be reported as soon as the sites’ power generation is resumed and deemed constant. The delay with regard to the finalization of the hydro power plants is primarily explained by bureaucratic obstacles, as for example by the problem that a large part of the imported technical hydropower equipment remained in customs for more than one year.

In all four plants the number of connected customers is lower than expected. Some households are reluctant to become connected as they shy away from the inhouse installation costs, the connection fee and tariffs. In addition, the reputation of MHP has been damaged due to early operational failures. It will take some time until the local population has gained the confidence to invest and decide to get connected. Therefore it is assumed that the connection rate will from now on gradually increase.

It proved to be very difficult to establish a market for hydro power in Ethiopia. Private enterprises did not show any significant interest to invest into micro hydropower. The government on the other hand focuses more attention to large hydropower. Consequently, funding for micro hydro power is hardly available. Nevertheless, the project will continue to provide certain assistance to this sector considering the huge hydropower potential of the country. Outcome targets will have to be drastically reduced unless the conditions become more favourable. With regard to future engagement, it is intended to focus more on upgrading existing water mills into pico/micro hydropower plants, which only requires smaller investments and equipment that can be purchased locally. Provided that future interested investors will be available, new MHP projects will be supported by technical advice and capacity building measures.

Solar Component: A number of MoUs have been signed between the project and other actors like Assistance to Health System Expansion (AHSE), Hunger project, Community Development Service Association (CDSA) to provide electricity for rural communities. According to those agreements preparatory activities were carried out:

- to install PV solar power systems in 4 selected health centres for ASHE.

- to install a PV Solar Power System at the Jaldu Epicenter building for the Hunger project; establish a charging station; train at least 10 individuals from the community in management and operation skills and to train at least one local private installation and maintenance company.
- to install a PV system in a cultural centre and a health post for CDSA and train at least one local private installation and maintenance company.
- to install a potable water supply system for 5000 pastoralists' community members and thus improvement of the food security situation of 80 members of 4 cooperatives for Islamic Relief.

In the field of solar lanterns EnDev did not yet succeed in delivering, because Ethiopian tax regulations were so far hampering the import of the lanterns and made them quite expensive. Taxes were lifted end of 2010, so that EnDev started to train solar companies and start-ups on technical and business issues. Thus increased distribution rates for solar energy products in general are expected, but also for solar lanterns in particular. However it still remains to be mentioned that certification of lanterns according to international standards is a very complex and expensive procedure for the solar lantern producers, why so far only a limited variety of products is available.

The project had originally foreseen to equip 50 battery charging stations as well as 10 PV kiosks. Only recently 3 battery charging stations have been installed.

The reason behind this delay also goes back to the complex import regulations for renewable energy technology. In order to find a solution around these obstacles, EnDev Ethiopia had planned to enter into a partnership with a private solar company that holds an import license. Unfortunately this company did not manage to stay in business.

As an alternative option the project intended in a next step to realize this original plan in the context of the EU Energy Facility. A proposal for a project on "Solar Kiosks for remote and off-grid areas in Ethiopia (SKET)" has been delivered in partnership with the company 'Solar 23'. However the proposal has only been nominated for a waiting list by the European Commission. After several months of waiting, it is now unlikely that the project will still materialize.

Policy component: As already mentioned, the project succeeded to position itself strongly in the Ethiopian Energy Sector, which is confirmed by a growing number of requests for information or cooperation from the side of the Ethiopian Government and the Donor Community. In such a highly politicised energy sector environment, the project could simply not afford ignoring the mainstream. Policy advice activities resulted in:

a) the finalization of the Energy Sector Mapping and Database Development Study (ESMAD), which represents the first energy database study in Ethiopia since 1984. The results of this study are considered as highly valuable by the actors in the sector, both national and international, and create a basis for the elaboration of a realistic national energy policy.

b) Support of "Centers of Excellence" (CoEs): Requested by the government EnDev Ethiopia also supports the creation of CoEs. These are supposed to be academic capacity building and research centres for specific renewable energy technologies. They are attached to selected universities in different regions. Three of the CoEs are already established at the universities of Adama (for solar) and Arbaminch/Jimma (for hydropower). A MoU for a CoE on windenergy is under preparation with Mekele University, and a MoU on Bioenergy is to follow. Part of the cooperation with these universities is the organization of various capacity building activities, such as recently an international training for hydropower experts at Arbaminch University.

c) tax exemption for renewable energy products: EnDev Ethiopia has since 2007 tried to elaborate tax- and duty free regulations for imported renewable energy technologies. These

attempts have finally successfully been achieved in cooperation with the 'Lighting Africa' initiative in the second half of the year 2010. However the respective customs officers are not (yet) able to fully implement this new regulation, as for them it is difficult to identify the material correctly (as for instance to distinguish solar batteries from car batteries). An offer from the project to train customs staff was however ignored by the revenue authority in charge. Even though a Memorandum of Understanding between GIZ and the respective line ministry had been signed on duty free import of material needed for the implementation of the project, the lack of cooperation by customs officers caused continuous and problematic unpredictable delays during project implementation. Despite repeated efforts by the project, even in alliance with the German Embassy in Addis Ababa, the respective Government Partners have not been able to identify a solution to these problems (since they were bound in their own deficient internal government structures). However, EnDev Ethiopia is optimistic that tax problems will be settled soon, so that the planned targets will be achieved with some delay.

d) the participation in all major donor coordination and planning platforms and the contribution to several planning documents.

### **Sustainability and handover strategy**

Stove Component: EnDev Ethiopia is persistently working with different actors in the stove business in order to retain the infrastructure and capacity among the project partners. Different bilateral consultation meetings with responsible government bodies at all levels were conducted during this reporting period to strengthen harmonization and joint implementation of the planned activities.

To ensure the sustainable supply of stoves in the market, EnDev Ethiopia is jointly working with the Ministry of Water and Energy on scaling up and enhancing the production capacity of the Tikikil and IRS producers. This includes the production of liners as well as of metal or cladding components. As part of this initiative, an extruder machine has been built as precondition for production of liners at large scale.

Successive monitoring and technical processes are followed jointly by project staff together with experts from the counterpart government. At regional level, project staff and representatives from the partner agencies are for instance intensively cooperating and also jointly carrying out the monitoring activities in the field, which leads to the development of a strong sense of ownership by local partners.

Special attention is given to enable the producers to maintain a marketable quality product which fulfils all the specifications and design according to standard. Moreover, the project will continue to support networking among the producers and different potential institutions and individuals to boost the demand side and motivate them and sustain in the stove business.

Solar Energy and Hydropower Component: Support has been delivered to the 'Selam-Awassa Business Group' on technology development and promotion. 'Selam-Awassa' has thus been enabled to produce turbines and to execute electro-mechanical installations.

The MHP sites' inauguration, combined with the handover of ownership to the community cooperatives, is planned for end of Feb 2012. After that time, the project will continue supporting a sustained connection rate of households and the promotion of productive use.

Different awareness creation and promotional activities have been carried out:

- Awareness creation event for each of Ererte and Gobecho MHP communities on "productive use of energy".
- Operation and maintenance training; MHP administration and management trainings in productive use of energy for the members of the cooperatives.
- End user trainings have been conducted on electrical safety and precautions for consumers among almost all the community members for all MHP sites.

In cooperation with the Ethiopian Hydropower Power Society, an action plan has been developed to facilitate a platform for the national hydropower developers and bankers to deal with MHP development and promotion in the country. This platform is to provide a spectrum of information including preparation of business-, investment and feasibility plans, laws and regulations as well as general conditions such as feed-in-tariff etc. The objective of this platform is to contribute to the development of the sector based on market conditions without need of external subsidies.

## Ghana

<b>Promoted Technology</b>	Grid			
<b>Project Budget</b>	900,000	<b>Spent until reporting date</b>	792,000	
<b>Project Period</b>	01.2010- 03.2013	<b>Reporting Period</b>	01.2010- 12.2011	
<b>Lead Executing Agency</b>	Ministry of Trade and Industry (MoTI)			
<b>Implementing Partner</b>	Ministry of Energy, District, Municipal and Metropolitan Assemblies, Local Business Associations, Regional Coordinating Councils, Environmental Protection Agency			
<b>Involved Bilateral / Multilateral Programmes</b>	BMZ: Programme for Sustainable Economic Development (PSED)			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	300	127	382	people
Cooking Energy for Households	NA	NA	NA	people
Electricity and/or Cooking Energy for social infrastructure	Social Infrastructure at 6 light industrial zones	3 zones using street lighting supplied by EnDev	3 zones using street lighting supplied by EnDev	institutions
Energy for productive use/ income generation	300 MSMEs	111 MSMEs	157 MSMEs	

### Project strategy and key components

In Ghana Endeavor continues to focus on the extension of grid electricity to selected newly established industrial zones. The selected industrial zones fall within areas where the national grid is available and accessible. These are mainly 11 kV or 33 KV medium voltage lines from which electricity will be tapped and extended to the industrial zones. A transformer is installed at the industrial zone together with a low voltage network which provides single or three phase electricity to the enterprises. The enterprises move to the zone and then apply to the Utility Company for the service connection and pay the full costs for their individual connections. The project provides all the hardware comprising:

- high tension poles and bare aluminum cables,
- Transformers and accessories,
- Low tension poles and cables,
- Control equipment and switchgear,
- Street lighting (in some cases).

The Municipal and District Assemblies pay the costs of labour for the installation of the electrical hardware. The business associations contribute labour in kind and individual enterprises pay for their connection fee.

EnDev Ghana is closely linked with and integrated into the Programme for Sustainable Economic Development in Ghana (PSED), which is jointly implemented by the Ministry of Trade and Industry (MoTI) and GIZ to support the creation of light industrial zones with adequate energy for productive use and other basic infrastructure services, in selected district capitals. The PSED also offers capacity building in Local Economic Development (LED), Profitable Environmental Management (PREMA) and business entrepreneurship (CEFE) to the targeted Micro-, Small- and Medium-Sized Enterprises in order to help them establish their businesses at the light industrial zones and manage the area sustainably. During the first phase of the programme (2006-2009), eight district capitals benefitted from

the “Energy for Productive Use” component of PSED, co-financed by “Energising Development”. In the current phase from 2010-2013, seven additional zones are being supported.

District Assemblies and local Business Associations have to contribute by designating, acquiring, and developing suitable land for the light industrial zones. The districts also provide additional infrastructure like roads, water and sanitation. EnDev facilitates the planning process and contributes to the installation of an electricity distribution network for the zones by co-financing hardware like transformers, and high and low tension lines.

Under EnDev II, ownership of the districts is being increasingly emphasized for sustainability. The districts do not receive other support for the infrastructural development than described above. The district assemblies and artisan associations have more responsibility for liaising with the electricity and other utility companies. PSED plays a stronger role in supporting the Energising Development interventions by promoting local and regional economic development activities around the supported zones. It is also expected that assemblies and local associations will provide street lights on their own to improve security in Zones as well as other Social Infrastructure such as Communal Meeting Halls, Schools etc..

### **Project progress (overall progress towards outcome target EnDev 2)**

Until December 2011 a total of 157 SMEs and 382 persons gained new access to electricity through EnDev 2 in six industrial zones. One more industrial zone was connected to the grid at the end of the year 2011, but no companies had moved there as of December 2011. In three industrial zones street lamps have been installed, providing light during the evening hours and improving security. One additional zone was provided with street lamps, installation will be done in the 1st semester 2012. Street lamps will be installed in at least three additional zones.

Out of 15 zones supported by EnDev (8 by EnDev I and 7 by EnDev II) only 6 have already produced countable outcomes as the process of connecting enterprises take quite a long time. Most of the zones are still under development and construction is in different stages. Even in the already established zones several problems still exist that slowdown the electrification of SMEs. In the following paragraphs the status of the individual zones is described to illustrate the various challenges and circumstances the project deals with.

The Agona Nkwanta industrial site was connected to the grid in 2011. Enterprises started to move into the zone and now are building their structures. Once the construction is completed the individual companies will be connected to the grid.

The installation of transformers at Bekwai and Agona Swedru is delayed due to the weak financial and organisational capacities of the district assemblies and business associations. In Bekwai 4 new enterprises got connected to the grid. At the same time, 7 companies cancelled their connection as they considered the electricity bills too high and did not need electricity for their work any longer. The companies also complained about frequent power outages and fluctuations, which are probably caused by overloaded old transformer of the nearby community. The progress in Bekwai generally is slow because of weak association structures and lacking interest from the District Administration in encouraging the full use of the extended zone. The project has stepped up with follow ups to promote dialogue between the Assembly and the Associations so that plots are allocated and the new EnDev transformer is connected.

In Agona Swedru EnDev supported the establishment of a dialogue platform. Stakeholders can discuss issues concerning the completion of the site. Some progress in the last six months was made, basic decisions were taken and executed ( i.e.coconut trees cut, and electricity extension completed after part payment to contractor, network now to be tested and connected by Utility). Through this dialogue platform the completion of the site will be facilitated.

The situation in Goaso hasn't changed since the last reporting period. Enterprises are not interested in relocating because the site can accommodate only a few more enterprises. The solution will be to establish a larger site which could accommodate additional enterprises. This was abandoned under EnDev I because of land litigation. The land issue has now been settled, an increase in number of SME could be reached if additional funds are made available.

In Kenyase the utility has supplied meters to connect the artisans who have moved to the site. No additional enterprise moved to the site during last six months because of pilfering of parts and other valuables at the site. 10 additional companies with electricity are recorded.

The light industrial area at Bechem is also filling rapidly.

Berekum continues to grow with additional 38 new start-ups. In total 396 companies have established their business in the Berekum zone, 83 of them can be attributed to EnDev 2.

In Techiman, only 3 new companies were recorded, including one start-up, some enterprises moved back to town. A decline in employment was recorded. On the other side, at least 20 enterprises have started to build shops in the zone and will relocate from their old places soon. All in all, the zone in Techiman is not likely to grow fast unless a clash between two associations has been solved. Agreement between them seems to be hindered by a chieftaincy dispute which is out of EnDev's influence.

The EnDev II zones are developing at a good pace. Electrical installations have been completed at Sefwi Wiawso and Enchi, where plot allocations have also been done. Installations in Dormaa are about 80% completed. Installations in Kumasi have just started. Installations are yet to start in three Towns (Axim, Suhum and Nsuaem) though all the hardware have been procured and delivered according to schedule. These Assemblies delayed because they did not make adequate preparations to secure the funds and engage contractors to carry out the installations. This has been resolved now.

In December 697 companies were established in the light industrial zones. Overall, 53% (366 SMEs) of them had a new or transferred grid connection, while the rest either did not need their own connection, or could not afford their own connection, although they are sure to "borrow" electricity services from their neighbours. 246 of the 697 (35%) 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. By December 2009 already 89 SMEs were reported to be the result of EnDev 1. Hence, this time it can be reported that 157 SMEs got new access through EnDev 2. These numbers show the steady growth in the zones that have been established earlier. For the zones under development a similar pattern is expected. The connection between budget use and target achievement in this project is clearly decoupled. The project is characterized by high investment into hardware at the start and middle of the phase, while the results (SMEs connected) can only be reached after the hardware has been procured and installed. Even then it is up to the speed of the individual SMEs related to their decision making process and influenced by external factors to move to the new zone. However, during the last reporting period a trend reversal seems to have started. In the two previous reporting period (Dec 2010 and June 2011) expenditures increased by 17% and 29%, which indicated the main procurement activities, while "target achievement" increase was two times at 9% related to the overall target only. In this report the 18% of the total budget was used (finalizing procurement) and the increase in "target achieved" was at 15%. For the upcoming reporting period it is expected that this trend reversal will be consolidated, resulting in more targets achieved with hardly any expenses.

The use of district economic development forums continues its roll-out, and an institutional partnership with the Institute for Local Government Studies is being pursued. The Profitable Environmental Management programme is accelerating, and the business entrepreneurship activities will be offered mainly for fees.

The main focus in the next reporting period will be to do more follow up and provide advisory support to get the zones completed. Business associations and MSME Sub-Committees will be strengthened through capacity development measures to improve to dialogue on issues and overcome bottlenecks to allocation of plots and fees to be paid for plots. Such improved dialogues will facilitate cooperation between business associations and district administrations.

### **Sustainability and handover strategy**

The development of light industrial zones and the use of local economic development planning has become part of national strategies for economic development. A Draft National Policy for Local Economic Development is being finalized and a National LED Technical Committee established with GIZ Representation. The Rural Enterprise Project III co-financed by IFAD and AfDB has adopted the broader concept of Light Industrial Area Development as key requirement for the provision of Rural Technology Facilities (RTF). These facilities are equipped with “State of the Art” Metal Work Machines for providing specialized services to enterprises in the Zone. One RTF has been constructed at Bechem Industrial Zone, while was constructed at Bekwai before the Endeav Intervention and another was constructed at the Nsuaem Industrial Zone. The presence of RTFs makes the zones attractive to enterprises and enhances the quality of their outputs.

M&E efforts are ongoing as well as changes to improve quality of services. Baseline studies are available. Formal monitoring is carried out semi-annually. An Impact Study was done in 2011; the final report is expected in March 2012. The project plans to train the focal persons and MSME sub-committees in seven (7) towns to support with monitoring in 2012 to enable them to do monitoring on their own in the future.

Materials and services are procured on the local market as much as possible. The electricity hardware is installed either by the local government or the local business associations. Once installed, the hardware becomes the property of the utility (VRA-NEDCO or ECG), who have the responsibility to operate and maintain the distribution network. In case of need for maintenance local technicians who installed the systems are available.

The major costs for developing the industrial zone are borne by the local governments and the private sector. The intervention subsidies can be seen mainly as catalyst funding and advisory services. In order to increase the outreach and to further promote the replication of the successful approach (development of light industry zones with adequate electricity and other infrastructure) after the end of the current funding under Energising Development an up-scaling is proposed. This would increase the awareness of the benefits of the clustered environment,

- a) by collaborating with additional districts and associations as well as other programmes (i.e. REP) in establishing more zones, building capacities of the private sector in business and organisational management and advocacy and
- b) by promoting the completion and use of existing zones towards achieving targets and increasing impacts.

In 2012, EnDev Ghana has planned experience sharing platforms at the regional level and will also train MSME Sub-Committees at the local level to enhance Public Private Dialogue. It is also planned to implement a pilot scheme to improve household waste collection and disposal, a simple scheme to improve the management of used oil and wood waste as a follow up to PREMA trainings in two zones.

## Kenya

<b>Promoted Technology</b>	Stoves			
<b>Project Budget</b>	3,300,000	<b>Spent until reporting date</b>	2,539,000	
<b>Project Period</b>	06.2009 – 12.2012	<b>Reporting Period</b>	06.2009 – 12.2011	
<b>Lead Executing Agency</b>	Ministry of Agriculture			
<b>Implementing Partner</b>	Ministry of Energy, Ministry of Education, NGOs, Private sector players, church organisations			
<b>Involved Bilateral / Multilateral Programmes</b>	BMZ: Promotion of Private Sector Development in Agriculture (PSDA), GEF: Renewable Energy Technology Assistance Programme (RETAP); Programmes and Projects of World Bank, DFID, UNDP, WFP, Practical Action, UNHCR, SNV, WFP, USAID Programme – Aphia Plus, GIZ Water Programme, German Red Cross, German Agro Action, British American Tobacco, Alliance One			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households				people
Cooking Energy for Households	1.020.000	2.800.000	2.928.699	people
Electricity and/or Cooking Energy for social infrastructure	350	97	97	institutions
Energy for productive use/ income generation	140	242	242	SMEs

### Project strategy and key components

The approach of EnDev Kenya remains focused on strengthening the role of the private sector in dissemination of improved cook stoves (ICS). Projects efforts are directed to identify key players who help to develop the stove market. Partnering with other donor supported projects creates opportunities for the project to reach even more people especially outside the current focal areas. The project also works on mainstreaming the idea of commercializing stove activities to partners as one way towards sustainability. This is being accepted by partners and some are even allocating budget lines for stove activities.

Main interventions continue to be capacity development of different stakeholders to:

- Scale up production/construction and promotion of ICS for households (HH)
- Scale up production/construction and promotion of energy saving devices (ESD) such as ICS or improved backing ovens for social institutions (SI)
- Scale up production and promotion of ESD for productive uses (PU) in SMEs
- Create awareness about clean stoves and proper use of ESD
- Ensure sustainability.

### Project progress (overall progress towards outcome target EnDev 2)

On household level the project is on track. It surpassed the target of 1,020,000 people set for EnDev 2. In Dec 2011, a total of 2,9 mio people had been reached with modern cooking stoves.

Nevertheless, there was an observed decline in number of stoves purchased in the last six months mainly due to the current economic turn down in Kenya. The prices of fuel and food

items have gone up by almost 30% and this has affected all other sectors. Naturally priority at household level goes to other pressing issues in the families.

About 2576 people are involved in production/marketing/installation of Jiko Kisasa stoves and construction of Rocket Stoves. There is no big difference compared to the previous six months where 2399 people were involved.

It may also be possible that the project has reached a certain glut on the market of the focal areas. This calls for moving out to new areas to extend the clean stove market.

Although the project has made huge progress by providing 6,4 million people with improved cook stoves (3.5 mio under EnDev 1 and 2.9 mio under EnDev 2) there is still potential for up scaling the activities considering a total population of 26.8 million people living in rural areas in Kenya.

The project is making effort to identify and work in close collaboration with big private sector player such as tea factories to increase the outreach. Kenya Tea Development Authority (KTDA) is an agency that markets processed tea on behalf of small scale tea growers. KTDA purchase the tea from the small scale farmers and process within the 63 factories from 7 regions in the country.

KTDA has facilitated the project to reach approximately 110,000 farmers in 6 factories, West of Rift. KTDA has taken this up and at the moment 3 factories have been allocated a budget to promote stove activities alongside their environmental conservation work. Most of this money will be used in sensitization activities. This initiative will be replicated in Central Kenya this year.

Another big partners is APHIA Plus, a USAID funded programme implemented by 4 strategic partners namely Path (Administrator), World Vision (Social Determinants of health), EGPAF (ARVS for children and PMCT), Jhpiego (Reproductive health). These strategic partners deal with crosscutting issues of capacity building, gender mainstreaming and stigma reduction.

EnDev collaborates with World Vision in Zone 1 (Nyanza and Western Provinces) through their local level CBOs. These CBOs deal with orphaned and vulnerable children and their households through support groups. These groups are now targets for stove dissemination. There is very good progress and reception for stove intervention.

Stove uptake by social institutions was relatively low. During last six months only 14 institutions mainly schools, installed a total of 37 stoves. Although many social institutions are interested to modernize their cooking system, they face bureaucratic barriers. As governmental institutions they cannot easily make decision on their own. Decision making is a long process that involves parents / teachers and the Board of Governors with the Ministry of Education having supervisory powers. Stove dealers find this procedure time consuming or they lack the negotiating skills to clinch a contract. Oftentimes institutions require competitive biddings by registered entities, which most small stove builders are not yet. Demand for kick backs in some schools makes it hard for stoves dealers to penetrate the market. Some schools require the artisan to provide the materials and construct at own cost then be paid in instalments as schools collect fees. This presents a huge capital outlay for the artisan. In addition, institutions are generally under funded by the Government, and most cannot spare funds for stoves despite inherent benefits.

The total number of reported Sis remains constants for this reporting period despite the 14 new SIs that got new stoves. So far the monitoring of SI was only recording sales to new customers. Replacement of stoves to older customers was not recorded, hence not reported. The project assumes that approx 50% of the old SIs did replace old stoves. Further analysis and follow up will be done until the next reporting.

In the current expansion plan, efforts will be aimed at the Ministry of Education Head office and the National Association of Head Teachers. Capacity building in marketing skills will be increased for the members of the improved stoves Association to penetrate the sector.

Efforts will also be made at the Ministerial level to sensitize the decision makers and advise them how SI stove dissemination can be done. On the other hand the success of the Global Environmental Facility (GEF) – funded project in Kenya on dissemination of Institutional stoves (IS) under the Renewable Energy Technology Assistance Programme (RETAP) - loan facility will be analysed. This project has more soft conditions for the loan compared to the banks. Probably EnDev can cooperate or learn from them.

The uptake of ICS for productive use has slowed to 26 enterprises taking up a total of 44 ESD in the last six months. This can however be explained by the fact that most enterprises within the project focal areas have been addressed and this trend may change if the project move to new areas. The number of reported SMEs remains constant this time. Similar to the SI monitoring the replacement of stoves was not included in the data collection process and will be followed up until June 2012.

There are some obstacles and challenges which have been identified that contribute to the low numbers in the PU category. Most hotel and eating house operators do not own the premises they work from. This makes it difficult to install permanent institutional stoves at those premises. Operators are sceptical regarding smokeless operations and demand chimneys for smoke extraction; a demand that artisans may not easily meet as it would require approval by Public Health Officers. This seems to be too bureaucratic for many builders.

The economic downturn has increased cost of quality materials for institutional RS. This price increase makes it too costly for most operators to install them. Most artisans still find it difficult to access credit from lending institutions to undertake “big” jobs. Public Health Department is taking smoke emission in public places as a serious threat to health, and it is an opportunity to collaborate with the Department to educate hotel operators to adopt ICS.

Observed Impacts: A progress assessment study done in Nov 2011 gives the opportunities to detect trends and challenges and compares the results from the Impact Assessment study in 2007. While firewood remains the main fuel due to availability, charcoal use has declined over the last years. 80% of the respondents use their ICS exclusively every day. 95% of ICS users indicate that they save firewood. The time and money saved is spent on productive activities respective on food and education.

More than half of the dealers (57%) indicated that stove business was their main occupation, while a third of them considered farming as their primary source of income. For 42% of them, stove business provided more than 50% of their household income. In 2008, the majority of dealers still considered farming as their main activity. The majority of producers and marketers worked full time, installers and builders mostly worked only irregularly or on a part time basis. Most of the dealers also mentioned the unsteadiness of their sales: 79% of them said they do not sell a steady number of stoves throughout the year. Yet half of the dealers hire others for help.

92% all dealers generate a reasonable profit out of their stove business. Also, the profit margin of a third was increasing every year since they started. The other two third identified major reasons for their negative trend: The difficult economic situation of the farmers resulting from the droughts and the increased costs of materials and/or transports. Another main challenge described by many dealers is the distance to reach their clients and the transport costs per stove.

A large majority of the installers, builders and marketers (85%) indicated that they sell stoves outside their home location. In 2008, the majority still worked within the district they live in – serving their neighbours.

There are variations of the socioeconomic distribution between improved stove users and non users. It is significant that better off and medium households are nearly twice more among the users of improved stoves than among households who don't use improved stoves. On the other side, poor households are twice as many within households who don't

use improved stoves than within households who use them. This shows the need for the project to find a way to reach the poor. The problem does not lie in the sensitization of this group as indicated by their high knowledge of improved stoves. The main reason mentioned by the majority of them for not buying an ICS was the lack of financial means. However, this reason alone might not be sufficient to fully explain the fact that poor families don't buy ICS. There is the need to further assess potential other factors which could drive their choice for not buying an ICS. This could be firstly done by assessing the presence of valuable goods within the same households e.g. cell phone, radio, etc. - which are more expensive than an ICS and would thereby exclude socioeconomic poverty as a main factor.

This could be explained by the fact that, irrespective of the socioeconomic background of the households, large families have a bigger interest in purchasing an improved stoves than small families due to the considerable savings they are able to make in terms of time spent on cooking and firewood collection, as well as money spent on firewood purchase.

### **Sustainability and handover strategy**

EnDev's approach to ensure long-term sustainability comprises the following aspects:

Commercializing of stove work: stove production is established in small private companies. These SMEs (small and medium enterprises) purchase materials and labour through commercial ways and hence, they (have to) sell their products (stoves) at a profit price to the market. This way the SMEs create income and will therefore continue with stove work beyond EnDev support.

Creation of "market awareness": capacity development at the local level is done with various players to ensure service availability close to clients. User awareness, cooperation with local organizations and of course the training of stove producers are important parts of this package.

Establishment, continued support and coaching of the Improved Stove Association Kenya (ISAK): ISAK is a forum for stakeholder owning and managing the sector (e.g. quality control, training of producers, awareness raising, code of conduct, lobby work, etc.).

In addition, long term quality products and future quality control will be ensured through the ongoing establishment of a professional stove testing center in Kenya within KIRDI (Kenya Industrial Research and Development Center).

Access to finance for stove production companies (work expansion / for startup capital) is provided by financing institutions (currently cooperation with two banks). Networking with Ministry of Agriculture staff at the widest geographical level (division) contributes to ensure continuity and the embedding of the work into the government structures. Networking and cooperation between stakeholders at all level strengthen their linkages towards each other.

### **Further information**

The recent EnDev - Kenya Progress Assessment, Nov 2011, gives way for consideration to increase the lifespan (used for EnDev) calculation of the various types of stoves promoted in Kenya (Jiko Kisasa and Rocket Stove). This study strengthens the findings of the Impact Assessment study, 2007 on the stove life span which in reality seem to be longer than initially expected. Once all data is analysed a proposal for a new life span counting will be made.

Observations made last year and the results of the stove testing, makes clear that mud rocket stoves have shorter life spans, especially the fire chamber. This creates more maintenance work for user. More efforts will be directed in promoting brick or inserts for the rocket stove construction especially for the fire chamber. These type of stoves have proven longer lifespans.

Initiative to create a forum to bring all players in the sector together is a big challenge as the carbon fund continues to distort the stove market. Bringing all players together will be taken as a priority in the coming six months.

**Mali**

<b>Promoted Technology</b>	Solar PV for Battery Charging Stations and Social Institutions			
<b>Project Budget</b>	2,000,000	<b>Spent until reporting date</b>	€ 1,432,705	
<b>Project Period</b>	07.2009 – 12.2012	<b>Reporting Period</b>	12 – 2011	
<b>Lead Executing Agency</b>	Ministere de l'Administration Territoriale et des Collectives Locales (MATCL)			
<b>Implementing Partner</b>	Direction Nationale de Collectivites Territoriales (DNCT) Agence Malienne pour le Developpement de l'Energie Domestique et de l'Electrification Rurale (AMADER)			
<b>Involved Bilateral / Multilateral Programmes</b>	Programme Promotion of Local Government (PACT)			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	19,800	0	4,768	people
Cooking Energy for Households	0	0	0	people
Electricity and/or Cooking Energy for social infrastructure	180	0	106	institutions
Energy for productive use/ income generation	0	0	0	SMEs

**Project strategy and key components**

The strategy of EnDev-Mali is to guarantee sustainable provision of electricity to rural private households by PV-driven communal battery charging stations (BCS) and to rural social infrastructure (SI) by SHS; in addition, installation of one PV based minigrid is contemplated.

BCSs remain property of the commune, are operated on fee-for-service basis and contracted to private service providers that are also responsible for operation and maintenance of the SHS in social institutions.

A percentage of BCS revenues and sometimes part of the fees charged for communal services are deposited into a fund to cover costs for repair and replacement.

Key interventions of EnDev are:

- Identification of rural communes that comply with EnDev criteria and good governance criteria and that have the capacity to contribute financially;
- Set-up institutional framework by agreement on (1) management committee selection; (2) assignment of duties/rights for operator, committee (3) stakeholder supervision;
- Training for (1) communal staff and management committee on tasks as owner and supervisory body; (2) service providers on O&M of PV-systems and business tools;
- Financing of installation of solar PV-systems for electrification of schools, health centres, town halls, solar street lights and BCSs (community contribution 10 – 20%).
- Technical and managerial coaching / backstopping for institutions and operators; integration of public energy services concept in communal development plans;

In comparison to EnDev 1, under EnDev 2 economic viability / purchasing power in the commune is a more important selection criterion to as much as possible safeguard sustainability.

## **Project progress (overall progress towards outcome target EnDev 2)**

After some initial delays caused by procurement problems, installation of solar equipment in 10 new communes is completed. Data from 4 of those have not yet been incorporated because of their very recent completion.

Already during the first phase of EnDev figures about the number of charged batteries seemed negatively impacted by (supposed) underreporting by the BCS operators. Operators have no interest to report high figures as it increases their fees to the owner. Therefore, a correction was made. In order to investigate the issue dataloggers were installed - the first results of which suggest that underreporting likely indeed occurs and might be some 20-30%.

Windfall gain- and the double energy factor in this project can realistically be set at nil. The replacement rate factor previously comprised both the ability to maintain the PV infrastructure as well as the population's capacity to replace worn out batteries. The latter component in retrospect seems unjustified and has been cancelled; the replacement rate is set at 50%.

EnDev 2 outcome also incorporates additional beneficiaries in EnDev 1 communes as a result of activities during EnDev 2; their number can be interpreted in different ways as the final ENDEV 1 result should be deducted - while that was calculated quite differently. In all a rather conservative number for additional beneficiaries was used.

EnDev 2 output targets (No of installed BCS) will be achieved during the project period. However, it will be difficult to achieve the outcome targets. At present only 25% of the set outcome target is met. With 4 more villages and a mini grid not counted in this monitoring, this figure will rise to 40 - .50% in half a year without additional measures.

The gap with the planned target is directly related to the low frequentation rate which on average now is 30% of the BCSs max capacity while dimensioning of the BCSs is such that, in accordance with initial surveys, BCSs should be used at appr. 70% of their maximum capacity. At 70% the planned target would have been met and in turn this 70% is also required to generate sufficient income so as to ensure sustainability.

Several options are currently discussed to increase the utilisation rate and the number of clients, thereby also ensuring sustainability. If this proves not to be feasible, a drastic change of the project strategy will be considered, including restructuring existing installations and focusing on other technologies (e.g. solar lanterns) for future activities.

Impacts have not yet been assessed.

## **Sustainability and handover strategy**

As mentioned above BCSs are frequented at strongly varying intensities, ranging from 17-75 % at community level of the frequentation required to ensure economic viability, or roughly 20-90 % after correction for underreporting (which then should not only be detected but also remedied).

A consultancy was done to investigate underlying causes and differences between communes; results so far are not sufficiently detailed to formulate commune-specific recommendations to boost BCS use.

This is now foreseen to be done during a joined working session in March 2012.

BSCs in itself are operated independently from the project and can continue without project interventions, although there remain serious concerns about economic viability and therefore sustainability. For EnDev installations in this respect still some hand over activities should be done.

Options for autonomous upscaling beyond the project boundary are limited; initial investment costs are high and largely subsidised; as setting up the fund for maintenance and repair already proves difficult, excess funds for upscaling in this set up are unlikely.

Particular emphasis is given to high quality training of the technicians who are installing and maintaining the solar systems. This is contributing to a higher quality of the systems and less maintenance problems.

## Mozambique

<b>Promoted Technology</b>	Solar, Hydro, Grid densification			
<b>Project Budget</b>	3,800,000 €	<b>Spent until reporting date</b>	€ 2,378,151	
<b>Project Period</b>	07.2009 – 12.2012	<b>Reporting Period</b>	12 – 2011	
<b>Lead Executing Agency</b>	Ministry of Energy (MoE)			
<b>Implementing Partner</b>	EdM, FUNAE, Provincial departments DIPREME, MFI's, NGOs and private enterprises			
<b>Involved Bilateral / Multilateral Programmes</b>	Decentralization Program (PPFD) and Education Program (PEB), Economic Development Program, BTC (Belgian Technical Cooperation): Rural Energy for Rural Development; World Bank: EDAP; Energy Development and Access Program.			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	45,600	40.474	42,398	people
Cooking Energy for Households	0	0	0	people
Electricity and/or Cooking Energy for social infrastructure	26	3	3	institutions
Energy for productive use/ income generation	203	55	60	SMEs

### Project strategy and key components

EnDev Mozambique is supporting grid extension, the construction of pico and mini hydro power plants on community level and the training of local SMEs doing business with PV systems in cooperation with several international private companies.

In the grid component, EnDev financed the connection of households to the grid based on prepaid meters. The focus had been on households in neighbourhoods of the outskirts areas around Maputo. Implementing partner has been the national utility EdM which selected a contractor for the implementation of the work on a key turn basis through an open public tender process.

The construction of pico and micro hydro power plants is supported with a new financial approach. In the first phase EnDev had financed almost all costs of the plants. The plant operators contributed with payment in kind (manpower) to the plant development. In the second phase, EnDev is currently working on implementing a commercial operator model in which the operator obtains financing for the HP plant and related productive use installations. EnDev contributes to the project by paying the electricity grid which transmits electricity produced by the HP plant to village households and shops. The operator will borrow a loan from commercial banks. These banks are not familiar with the risks involved in the HP project and only accept a small percentage of the total project investment as collateral. Due to the high refinancing costs in Mozambique most banks work with interest rates above 25% and loan maturities of up to two years. EnDev is preparing an agreement with FUNAE under which HP operators could obtain financing from FUNAE with below-market interest rates and loan maturities of up to four years. Though most of the operators of the hydro power plants have experience with running a (small) business they are not experts in project finance, therefore the most important task is to develop a business plan together with the operator and enable him to make his own decision of whether he feels comfortable to request the loan or not.

The project interventions in the solar PV components aim at working with “partners” that purchase, own and sell material. Main activities of that component include:

- Training and capacitating local importers, wholesalers and retailers of PV components and SSHS about technical and quality aspects of PV systems
- Commercial training of above mentioned market actors focusing on how to promote sales of SSHS, carrying out marketing campaigns and improving customer service
- Advising importers on how to identify and where to source quality PV products
- Establishing linkages in the market between importers of quality PV products offering guarantees and (potential) retailers with the aim to raise the general quality level in the market
- Supporting local “partner” companies in the establishment and improvement of a distribution network for their products
- Realization of awareness raising campaigns for SSHS among potential customers

The project is also evaluating a possible involvement in dissemination of improved cook stoves, in the installation of battery charging stations and the introduction of modern energy technologies for productive use. As complementary activities the project is mapping energy activities in Manica province and supporting the government in establishing a database on existing energy studies.

### **Project progress (overall progress towards outcome target EnDev 2)**

**Grid:** EDM finished successfully the agreed grid extension activities providing around 38,000 people with access to electricity under EnDev 2. EnDev has currently no plans to renew the contract with EDM due to budget reasons at reporting time.

**Hydro power:** As result of EnDev activities 154 kW has been installed serving 241 households, 1 school, 1 health centre, 1 community centre, 39 public lighting systems and 60 small enterprises. Preliminary activities are underway to install 9 micro and 5 pico hydro plants in close cooperation with the provincial department of the ministry of energy (DIPREME) and FUNAE in Chimoio. Another 60 sites for pico and micro hydro have been identified including site details and private individuals to own the power plant. In addition to site development, EnDev supports the establishment of the Chimoio Hydro training centre (renamed: ECHD; Excellence Centre Hydro Department). Comprehensive ToRs have been drafted and subject to discussion with the main partners early 2012. Principal (legal) support has been obtained from the central government department. This activity has been implemented in collaboration with the Oldenburg University.

The hydro power component faces problems in the development of the new financing model. Although FUNAE has offered a serious support which could bring the interest rates of the banks potentially down with a few percentage points still the banks were reluctant and virtually non responsive with rigid positions regarding the assessment of collateral values. Banco Terra did not respond to any of the promises made in the MoU. Efforts to stir up the process at the head office in Maputo led to further unacceptable propositions and the observation that the internal communication with branch offices was far from ideal.

In the meantime the development of business models and cost benefit calculations matured and were discussed with FUNAE. The interest of FUNAE is continuously increasing since it was revealed that one of their first committed micro hydro project costs 30 times the price that EnDev is counting with. In November FUNAE has offered a new lending scheme for in principle all the micro hydro projects, with potentially attractive interest and payback terms. The details are being worked out at the start of 2012. FUNAE owning the loan and being one of most important actors in the field of rural electrification avoids endless discussions on collaterals and intricate extra bureaucratic decision making structures for the time being. Once the business models and lending schemes prove their value and the private sector has build up experience in the construction matters, the micro hydro sector may start to function

properly opening opportunity for development banks to participate. KfW and the French AfD have a pronounced interest to work in the sector through these banks.

Despite previous measures and some results in involving the private sector in the contracting for the micro hydro schemes it has become unavoidable to impose a weekly monitoring and evaluation protocol with the NGOAKSM at the start of 2012.

**Solar:** EnDev is cooperating with the University Eduarde Mondlane, University of Ulm and two companies (Phaesun and Fosera) which implement a DEG funded Public Private Partnership. One of the companies, Fosera, recently started assembling and “selling” stand alone small solar systems. Also the initiative to establish a solar equipment test facility can be counted as “offspring” of the PPP. In addition the PPP included training of 73 young entrepreneurs. However, the rather scattered (twice per year, one week) training sessions performed by the representative from the University of Ulm did not lead to any tangible result by the people trained, as interviews by EnDev showed.

Parallel to the PPP EnDev trained 76 young individuals and cooperates with 8 local companies. For this purposes EnDev employed 2 previous employees of SolarNow Mozambique first as consultants for a market study and later for providing training. Sales of the partner companies and trained individuals that qualify for EnDev counting are being monitored on a bi-monthly basis. Similarly other trainees (other than the associated businesses) are monitored on progress, initiatives and further needs. In order to upscale the sales volume of its partners, EnDev is in discussion with major supermarket chains about integrating solar PV products in their product portfolio. Thanks to some lobbying efforts of AMES-M our partner FUNAE has finally signaled interest in selling products of AMES-M partner companies via their network of gas stations. AMES-M is discussing this possibility with FUNAE currently in more detail. First sales outcomes of the PicoPV activities are expected for the next reporting period.

In addition to the above mentioned components EnDev Mozambique was involved:

- in the mapping of energy sources in the entire country, which is done by a Portuguese company (Gesto) and
- in the development of a database of energy related publications from Mozambique.

### **Sustainability and handover strategy**

The conclusions of the impact study on grid densification in Matola and Maputo outskirts prove a high degree of effectiveness and sustainability. EnDev is considering to contract EDM for similar or smaller scale activity perhaps in the coming years. However, funds are not available for this purpose within the given budget.

EnDev handover strategy is largely based on a close cooperation with many local implementing organisations. These organisations will be able to continue the activities once EnDev is coming to an end. Furthermore the involvement of the educational infrastructure as well as private sector and NGO's on both implementation and inclusive capacity development level, guarantees a sustained knowledge base in the country about our inputs, with the obvious potential of being transferred and available for future generations.

## Rwanda

<b>Promoted Technology</b>	Biogas/Hydro			
<b>Project Budget</b>	7,200,000€ <sup>6</sup>	<b>Spent until reporting date</b>	2,770,000€	
<b>Project Period</b>	10.2009 – 12.2012	<b>Reporting Date</b>	12 – 2011	
<b>Lead Executing Agency</b>	Ministry of Infrastructure (MININFRA): Energy Sector			
<b>Implementing Partner</b>	MININFRA, Private sector (MHP), SNV (Biogas)			
<b>Involved Bilateral / Multilateral Programmes</b>	GIZ Health Programme Rwanda			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	19,700	1,813	1,813	people
Cooking Energy for Households	20,544	7,329 <sup>7</sup>	7,257 <sup>8</sup>	people
Electricity and/or Cooking Energy for social infrastructure	5 SI with biogas system			institutions
Energy for productive use/ income generation	30			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 focuses 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.

The activities to achieve the 1<sup>st</sup> key intervention include the development of capacity in Rwandan small and medium-sized enterprises (SMEs) through technical and business assistance as well as co-financing.

In particular, the strategy for capacity development of these companies focuses on:

- Technical assistance and training on design, construction, operation and sustainable maintenance of the MHPPs
- Advice and training on business development, management and provision of services
- Subsidy in form of a grant of no more than 50 per cent of the investment costs. The private developers have to raise the remaining amount by themselves with the condition of providing at least 15 per cent of the total costs as equity.

For the achievement of the 2<sup>nd</sup> key intervention the following activities have been undertaken: Political support and institutional guidance; Assistance and tutorage for sector consolidation; cooperation with other donor institutions in aligning (sub)sector (technical and financial) development support, in supporting the development of conducive policy and regulatory frameworks.

<sup>6</sup> The total budget indicated in the last progress report amounted to 5,000,000 EUR. Due to additional funding of 2,200,000 EUR based on EnDev 1 commitments for Rwanda the total budget increased.

<sup>7</sup> 7329 – This figure relates to the total number of people reached with NDBP by June 2011. By that time 5185 people could be attribute to EnDev 2

<sup>8</sup> 7257: This figure can be attribute to EnDev 2

PSP Hydro currently supports six private utilities/MHPPs. In addition, the project has started to support MININFRA and the Energy Water and Sanitation Authority (EWSA) in the privatisation of publicly funded MHPP. Negotiations with other donor institutions are ongoing in order to raise additional funds to scale up the PSP Hydro project.

**Biogas:** EnDev has been supporting the National Domestic Biogas Programme to roll out household biogas digesters throughout the country. The 1<sup>st</sup> phase of the national domestic Biogas program (NDBP) was implemented by the Ministry of Infrastructure (Energy section) with technical support from GIZ-EnDev and SNV between 2007 and 2011. GIZ-EnDev supported the program with an advisor who until the end of 2010 was placed directly in the Ministry to support biogas program as well as other activities from the Ministry. GIZ EnDev provided also assistance in the form of subsidies and covered a certain share of the programme costs within the NDBP. The EnDev involvement in the NDBP ended in December 2011.

The target group of the NDBP was households in rural areas that own at least 2 – 3 cows in a stable near the homestead under zero grazing conditions. A baseline indicated that more than 120.000 households qualify technically for biogas digesters. The initial project memorandum called for installation of 15.000 digesters during the 4 years of the program. The program also cooperated closely with a bank in Rwanda (Banque Populaire du Rwanda) in the development of a uniquely tailored micro credit line. The credit became available late 2009 and is now available in the whole country.

The costs of a typical digester proved to be much higher (\$1400) than originally estimated (\$859) and the market response had been much slower. End of 2009 the target was reduced to 3500 digesters within the project budget.

## **Project progress (overall progress towards outcome target EnDev 2)**

**PSP Hydro:** The grid connected Micro Hydro Power Plant (MHPP) of Murunda (96 kW) started operating on 12.03.10. It is the first power plant ever developed and operated by a private company in Rwanda. Two more MHPPs, Mazimeru (500 kW) and Musarara (438 kW) are under construction and are expected to start operating in early 2012. The development of these three plants was started under EnDev 1 already. However, the latter two could not be completed until now since several unforeseen factors have impaired the development of private-sector led MHP in the country in general. These factors include:

- Absence of a clear regulatory framework; no standardized license procedures were established in the beginning; insufficient feed-in tariffs and non-existing wheeling tariffs, etc.
- Grid extension plans of EWSA are not coordinated with private developers
- Lack of capacities (managerial as well as technical) of local developers
- Difficulties to obtain bank loans due to regulatory uncertainties

The complete absence of a clear regulatory framework at the beginning of the project meant that a significant amount of time had to be spent to support the putting in place of the required regulatory processes and procedures, and today good progress on this can be reported. This will ensure that a faster development of new MHPPs can take place in the future. For example, a standard PPA model (PPA-Power Purchase Agreement), environmental clearance and standardized license procedures are now in place. As result, the timeframe to obtain a license has decreased from initially 6 months to 2 weeks. In addition, appropriate feed-in tariffs are to be promulgated in February 2012<sup>9</sup> which reduce uncertainties for investors and will also make it easier for the latter to obtain bank loans. In the case of Mazimeru, a wheeling tariff agreement is about to be concluded which will constitute the first arrangement of this kind in Rwanda and Sub-Saharan Africa. These developments make it likely that in the future private MHPPs can be developed significantly

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<sup>9</sup> On 27.2.2012 RURA has published the Feed in Tariff through their webpage

quicker and that EnDev will therefore reach most of the beneficiaries targeted within the coming years.

As a result of the lack of coordination of EWSA's grid extension plans with private coordinators, most plants in spite of originally being designed as off-grid plants had to be connected to the national electricity grid in Rwanda. This delayed the development of MHPPs as business plans had to be rewritten and project feasibility to be re-evaluated to account for on-grid delivery. Additionally, within the framework of EnDev Rwanda it was no longer possible to count individually connected households. A new counting methodology had to be decided on which relates the power fed-into the grid by private PSP developers to the total amount of electricity produced for the national grid and the total number of households connected.

Due to the lack of capacity within the sector a significant amount of work in terms of capacity building had to be done upfront. While this work is still in progress the example of REPRO has shown that once the first MHPP has been completed operators are capable of running it efficiently and show interest in developing further projects. ENNY and SOGEMR (the developers of the Mazimeru and Musarara projects) will soon join the ranks of REPRO and have also already started working on new projects which are likely to be developed much faster than the first ones.

While these factors have already impaired the development of the Mazimeru and Musarara power plants, case specific factors have also contributed to slowing down progress. In the case of Mazimeru, for instance, the completion of the plant was delayed by the late delivery of plant components (penstock) being held at customs over 8 months (negotiations of Enny with MINECOFIN, RDB and MININFRA over re-imburement of customs duty has been ongoing for over a year). Insufficiently qualified subcontractors had to be replaced and heavy rainfalls caused damages to the intake channel which led to the date for commissioning being moved. Moreover, the bank loan necessary to cover the resulting cost increases was difficult to obtain due to the absence of appropriate feed-in tariffs; tariff negotiations with EWSA took more than one year. Nevertheless, by now most of these obstacles have been overcome, leading, in the end, to stronger companies and clearer framework conditions; and once the plants start operating in early 2012 this will add significantly to the number of targeted beneficiaries reached.

Three more projects are under study: Gasumo (83 kW), Kavumu (285 kW) and Mashyiga (140 kW), which will be developed by new implementing partners (Calimax, REGREPOWER), and by REPRO.

Moreover, during the last year the government has begun to adopt the PSP Hydro private sector approach for the micro hydro sector as its own which constitutes a significant policy impact. GoR is now planning to privatise all publicly funded MHPPs in the country, which fail proper management, and O&M. Following a request of MININFRA, PSP Hydro has already carried out a technical and financial audit of the first five pilot plants to be privatized and has organized a validation workshop with all relevant stakeholders in December 2011. During this workshop the results of the study and the proposal for further steps were agreed. Thus, a lease contract with private operators for these plants is planned to be concluded by the end of 2012.

PSP Hydro proposes that part of the beneficiaries (25% proposed) of this privatization process should be counted towards the EnDev project due to PSP's significant involvement in the privatization process. If this was to be implemented an additional increase in the number of beneficiaries reached could be expected within the coming year.

**Biogas:** By December 2011 a total of 10.469 people gained access to biogas technology in Rwanda through construction of 1,773 household biogas digesters within the implementation of the NDBP. The total number of digester achieved is by far lower than the revised target. Currently the monthly production rate of new digesters has stabilized around 65. The number of people reached that can be attributed direct to Endev 2 in Rwanda is currently at 7,257

persons supplied with cooking energy. Even though EnDev has phased out of the program it is expected that a 20% share of the future installations can be attributed to be spin off results of the EnDev intervention, hence a moderate increase in the future reporting is expected.

The NDBP trained approx. 100 technicians out of which 40 have established themselves in the biogas business. Interested customers can access a special biogas credit line that was set up with the EnDev's support to the NDBP.

### **Sustainability and handover strategy**

PSP-Hydro: The case of the 1st successful MHPP developer (REPRO) shows that the technical support and the grant provided is enough to reach technical and financial feasibility for the project. Therefore, individual projects developed by PSP Hydro are expected to survive even after the termination of the project in Rwanda. Also, the regulatory and policy framework has considerably increased during the last years. However, there are currently not enough private companies within the hydropower sub-sector in the country to make it sustainable and self growing sector.

Yet, other donors are increasingly becoming active in the field and are adopting the PSP Hydro approach. Even more importantly, with the GoR increasingly adopting the privatization approach as its own a positive signal has been sent indicating continued support for private companies in the micro hydropower sector after the exit of the EnDev programme. It is expected that from this continuous support, existing companies will expand and new will develop. With the planned privatization of all community-managed MHPPs within the country it can carefully be expected that a necessary critical mass of private MHP projects will develop that allow a, be it limited, number of companies to subsist or thrive within the sector.

Biogas: EnDev phased out stepwise during the final year of the joint implementation of the 1st phase of NDBP. Thereby EnDev handed over responsibility and ownership for the NDBP to the Ministry of Infrastructure and strengthened the technical advisor role of SNV. Indicators of MinInfra taking over ownership is the clear financial commitment to cover the program cost, hence reducing the need to further EnDev financing into program costs. However, the three MoU parties agreed on a future demand for additional external support (TA and subsidies). To attract other new donors EnDev supported the NDBP with the preparation of a proposal to attract funding for the 2nd phase of NDBP.

During the program several challenges that slowed down the progress of the program were identified by review missions from EnDev and SNV:

- 1) lacking program autonomy/flexibility and management capacity of the NDNP unit at Mininfra
- 2) costs/affordability of digesters
- 3) demand orientation of market development and decentralization.
- 4) high program costs vs number of digesters achieved.

These challenges were tackled but not fully resolved by the NDBP which resulted in continuous low numbers of new digesters being installed. Resolving these challenges completely will be the key for a lasting success of the program.

In 2011 NDBP was moved out of the Ministry for Infrastructure and settled in the newly founded EWSA (Energy Water and Sanitation Authority). This bears the chance for higher autonomy and such more flexibility for NDBP.

The product costs and hence the end user costs have been reduced in 2011 through the market introduction of a smaller system size. In 2011 17% of the new installations were these 4m<sup>3</sup> systems. Additional cost reductions and probably design changes are necessary to reach a bigger customer base.

The program still needs to open its focus further to enter into the high demand market areas.

### **Further information**

<http://www.gtz.de/de/weltweit/afrika/ruanda/17218.htm>

[http://energypedia.info/index.php/Rwanda\\_Country\\_Situation\\_r.e.](http://energypedia.info/index.php/Rwanda_Country_Situation_r.e.)

<http://endev.energypedia.info/index.php/EnDev-Rwanda>

[http://energypedia.info/index.php?title=File:Psp\\_hydro\\_rwanda\\_baseline\\_report\\_-\\_rwi2009.pdf&page=1](http://energypedia.info/index.php?title=File:Psp_hydro_rwanda_baseline_report_-_rwi2009.pdf&page=1)

EnDev Rwanda (2012). Internal Project Description and Impact Evaluation (available soon).

MHP Feed in Tariff – published on 27.2.2012:

[http://www.rura.gov.rw/docs/REGULATIONS\\_ON\\_FEED\\_TARIFFS\\_HYDRO\\_POWER\\_PLANTS.pdf](http://www.rura.gov.rw/docs/REGULATIONS_ON_FEED_TARIFFS_HYDRO_POWER_PLANTS.pdf)

## Senegal

<b>Promoted Technology</b>	Solar/Stoves/Grid			
<b>Project Budget</b>	7,200,000	<b>Spent until reporting date</b>	5,841,745	
<b>Project Period</b>	04.2009 – 12.2014	<b>Reporting Period</b>	12-2011	
<b>Lead Executing Agency</b>	Ministeres en charge de l'Energie (MICITE)			
<b>Implementing Partner</b>	Direction des Hydrocarbures et des Combustibles Domestiques (DHCD), Agence Senegalaise de l'Electrification Rurale (ASER)			
<b>Involved Bilateral / Multilateral Programmes</b>	Promotion of Renewable Energies, Rural Electrification and Sustainable Supply of Household fuels (PERACOD)			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	59,700	0	0	people
Cooking Energy for Households	400,000	100,077	174,819	people
Electricity and/or Cooking Energy for social infrastructure	549	0	0	institutions
Energy for productive use/ income generation	145	0	0	SMEs

### Project strategy and key components

**Stove component:** The focus is on establishing a commercial supply-demand system for ICS. EnDev 1 started in urban centres. EnDev 2 is focussing on fostering the achievements in the large cities and the expansion in smaller towns and rural areas. The increase of professionalism of producers of stoves and inserts (use of machines) shall increase both quantity of stoves produced as well as the quality of stoves through standardization. Distribution networks shall be expanded and strengthened.

**Electrification component:** Electrification of rural villages is based on concessions given out by ASER, on demand of the village, through either SHS (small villages) or minigrids and grid extension (larger villages). In addition to household electrification some social infrastructure is generally electrified. Systems are operated and maintained on fee for service basis by several private operators. EnDev 2 essentially is an extension of EnDev 1, i.e. electrification of more villages according to the same strategy.

### Project progress (overall progress towards outcome target EnDev 2)

**Stove component:** Current result is 75% more than last reporting period and app. 45% of the overall target. Results in Dakar remain high (app. 20,000 stoves per half year). Sales in Kaolack are a bit lower as in the first half due to seasonal effects. Furthermore, EnDev introduced a better separation of stove counting to ensure that stoves which were produced in Kaolack but sold in other regions will be counted at the location of the end-user and not at the place of the production as it was done in the last reporting. About 2000 stoves were sold in the new regions, of which 65% were produced in Dakar, 13% were coming from Kaolack and 22% were locally produced. Furthermore, 12 schools have bought ICS for their canteens.

So far the focus was on the increased efficiency and quality (use of machines) of the production in Dakar and Kaolack. Since the beginning of 2011, the promotion of stoves in new (rural) regions started. It was based mainly on stoves produced in the 2 urban centres. The potentials for the building of own production systems in the rural areas have been investigated and the training and support of new producers will increase in the first half of

2012. This will raise the stove sales in the new regions until the end of 2012 at a large extend.

In the stove component approximately half of the dedicated funds have been spend so far and 45% of the overall target has been reached. Hence the speed of spending and achievements are roughly on the same level. It is projected that current funds will last for another 3 semester. Based on scenario calculation, it is likely that EnDev Senegal will achieve between 80% and 120% of the target of 400,000 people by then.

Electrification component: Apart from a small net increase in beneficiaries in villages electrified under EnDev1 (not reported), EnDev 2 has not yielded results in terms of beneficiaries in newly connected villages yet; implementation of the project by now thus is delayed by nearly a year.

Delays are caused by:

- Delays in tendering and purchasing, resulting from administrative - and supply problems (wrong specifications – leading to issues being returned /replaced, non-availability etc).
- Social unrest in Senegal over the past year related to presidential elections; while not impacting EnDev directly, it slowed down related administrative procedures.
- Delays in operator selection by ASER, which had to be repeated due to administrative errors; While EnDev could have proceeded with installation of systems in the mean time, it was opted to wait for the result of the tender, to make sure that the company installing a system will subsequently also operate it (rather than those potentially being different companies), believing that this will contribute to the project's sustainability as operating one's 'own' installation likely increases the sense of ownership.
- Delays related to the programme strategy. EnDev 2 has opted to maximally benefit from economy of scales, purchasing materials in one go, tender installation and operation in one go etc. This approach resulted in delays, when the disbursement of required funds was reduced at headquarter level (for reasons of fund management of the EnDev programme and thus beyond EnDev Senegals scope) from 2010 onwards, as funds available sometimes were insufficient to finance the next step in the process, forcing EnDev to slow down activities. This raises the question if the set up of the programme should not have been altered at the time so as to better fit the available funds, i.e. cutting up the project in parts to be finalised one after the other. EnDev Senegal opted not to do so, believing that sticking to the original plan eventually benefits the quality and sustainability of the project, as in the present set up maintaining and controlling quality is easier while the economy of scales eventually results in reduced cost of services for the target groups, whose capacity to pay is quite limited.

While no connections are made yet, various results have been achieved; at present only the actual installation remains to be done, implying that beneficiaries can quickly be connected over the next months. Results so far include:

- All materials are tendered, procured, delivered and presently stored; all in all this concerns 3500 PV panels and related batteries, chargers, inverters, wiring, lamps, etc., for installation of 50 mini-grids, 2100 SHS and 240 street lights;
- All stations for housing mini-grids were constructed and backup gensets delivered on site;
- All 50 mini-grid layouts were finalised and will serve as a base for grid installation;
- All medium tension connection layouts were finalised;
- Grid installation was completed in 25 villages;
- A tender for mini-grid installation and operation was launched in August 2010 and evaluated; as offers contained quite some omissions, evaluation took longer than projected; operators were informed about the outcome in September 2011;

- In the Peanut Basin one EnDev 1 operator (NSRESIF) won a lot with only Grid extension, one PERACOD-partner (INENSUS) won a lot with only hybrid mini-grids and a new participant won a lot with hybrid mini-grids and SHS;
- In the Casamance two EnDev 1 operators each won one lot;
- Technologies were selected for each village and the selection was validated by ASER;
- All future EnDev2 villages are visited by field agents organising village meetings, aiming to raise awareness and inform people about next steps.

Completion of installation, hence connection of beneficiaries, is now expected by end of 2012.

An extension of the project phase till December 2014 is proposed with the intention to compensate the delays.

### **Sustainability and handover strategy**

Stove component: Due to the reinforcement of the production system with the introduction of machines, the program is still actively involved even in Dakar and Kaolack. The producers are organized in associations which will play a major role in the promotional activities in the next year. A handover strategy still has to be developed even for the rural areas where production has just started.

Electrification: EnDev 1 villages in principle are self sustainable; the service fee should enable operators to properly maintain systems. Handover still entails follow up and monitoring.

With EnDev 2 installations not yet operational, handover issues are not relevant yet, though eventually the same issues will be concerned as in EnDev 1 villages.

For the upcoming period in particular the reservation of funds for repair and maintenance, crucial for the sustainability of the intervention will be monitored.

## Uganda

<b>Promoted Technology</b>	Solar/Stoves/Hydro/Grid/			
<b>Project Budget</b>	4,000,000	<b>Spent until reporting date</b>	3,090,000	
<b>Project Period</b>	06.2008 -12.2012	<b>Reporting Period</b>	06.2008 – 12.2011	
<b>Lead Executing Agency</b>	Ministry of Energy and Mineral Development			
<b>Implementing Partner</b>	Rural Electrification Agency, NGOs, Private Project Developers			
<b>Involved Bilateral / Multilateral Programmes</b>	BMZ: Promotion of Renewable Energy and Energy Efficiency Programme (PREEEP)			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	29.000	1.888	1.867	people
Cooking Energy for Households	1.100.000	676.385	676.385	people
Electricity and/or Cooking Energy for social infrastructure	194	34	34	institutions
Energy for productive use/ income generation	240	72	62	SMEs

### Project strategy and key components

Energy is one of three GIZ focal areas in Uganda. EnDev is embedded in the larger GIZ Energy Programme that also includes a direct BMZ assignment. EnDev Uganda has two programme components:

1. Dissemination of improved cook stoves (ICSs) for households, SMEs and SI;
2. Rural electrification (households, SMEs and SI) through solar PV, hydro power and grid extension/densification

The objective of the programme is to improve and implement approaches adapted to specific needs and challenges of the Ugandan context so as to ensure high up-scaling potentials.

Based on experiences gained so far, the programme initiated a review of its strategies, approaches and activities, with the aim to improve long term sustainability and the cost-benefit ratio. The speed at which adjusted interventions will result in increased numbers of people reached can't be predicted yet; first results will show during 2012.

**ICS:** The ICS component implements a three-fold approach to best serve the target groups:

- 1) Urban: support to commercial stove producers (e.g. establishment of a stove producers association)
- 2) Rural: Training of trainers of local stove artisans aimed at reducing costs for stove production and increase affordability for the rural poor by use of locally available materials.
- 3) Institutions and SMEs: technical support to professional producers of institutional stoves and ovens accompanied by a subsidy scheme

In urban areas the project focuses on the commercial dissemination of stoves through established stove building companies.

In rural areas a pyramid method of training is used, trained staff passes on their skills to producers, creating an efficient snowball training system, quickly reaching many beneficiaries. Through financing contracts the project supports local NGOs that were already involved in community work. These NGOs also are trained in the implementation of ICS projects. They are responsible for mobilisation and awareness activities as well as for

training ICS producers. In order to ensure ownership, beneficiaries participate in constructing their own stove, supported by local stove builders, while providing cash or in-kind compensation for the stove builders' labour.

Drawing from recommendations given in the sustainability study report (EnDev, 2009), internal project progress reviews and lessons learnt in the course of implementation, the ICS team initiated a review of the ICS dissemination approach. Problems identified were high dropout rates of trained stove builders, quality issues and sustainability of the market structures created. In the 2nd half of 2011 the team concentrated on strategy development rather than further up-scaling based on old concepts. Focus was put on replacement of stoves in districts where the project had been active before. For new target areas an adjusted strategy shall be implemented following a sustainable commercialized approach.

The new approach concentrates on close cooperation with the private sector. Capacity development in business and marketing skills and quality control will be key activities. For selecting artisans, the estimated potential to set up economically viable and sustainable businesses will be a key criterion. This will be coupled with creation of localised stove production centres, also serving as selling points and providing after sales services. A baseline study is conducted in the West Nile region to identify new districts for up scaling.

MHP. EnDev Uganda implements MHP projects in Bwindi (64kW) in the western part of Uganda and in Suam (40kW) in the east near the Kenyan border. The benefiting communities play an active and crucial role in project planning, implementation, operation and maintenance. Advantages of this community-based approach are the high sense of ownership, resulting in long term sustainability and development of low-cost technological solutions as showcase.

Both projects are far away from the national electricity grid as at the start it was ensured that according to national policy, the grid would not be extended to these areas in the foreseeable future. In both project areas a viable economic basis exists: in Bwindi a hospital and in Suam high SME activity, forming the basis for a (financially) sound operation.

PV: The programme supports creation of rural markets for SHS and Pico PV Systems. The key activity is support to rural solar dealers and MFIs in establishing business. Key interventions are business and technical trainings, promotion and branding under the umbrella campaign "access to solar" and establishment of a network linking potential customers, rural dealers and MFI's. All interventions are closely coordinated with the Photovoltaic Target Market Approach (PVTMA) programme implemented by the Rural Electrification Agency (REA) and Business Uganda Development Services (BUDS-ERT).

EnDev Uganda supports installation of solar PV for SI to improve social services for the target group. Institutions are selected according to defined selection criteria – geographic focus is on Northern Uganda (West Nile and Lango Region). Institutions contribute at least 20% of the PV system costs, the project funds the rest. Installation is done by local solar companies to ensure proper after-sales-services. The ownership of and responsibility for solar PV system is handed over to the institution or the district in charge respectively.

Grid: The programme supports connection of SI to the national grid and grid extension towards trading centres with relatively high population densities. These activities in the contexts concerned seem to be more cost effective than installation of mini grids.

Within the grid extension activities, focus is on productive use. The target SMEs are not only small shops and phone charging boots, but also more energy intensive businesses (grain milling, etc.). Training and awareness rising on possibilities of electrification is provided to the SMEs and the surrounding community.

For cost efficiency reasons SI will only be connected when located close to the national grid. Similar to electrification by PV, SI is required to contribute at least 20% of the overall costs. Project sites encompassing more than one institution are approached at community level, whereby the community has to cover at least 20% of the costs and individual connections to

households and SMEs are negotiated between the customers and the “electricity committee” of the community. The project supports this facilitation process.

The grid extension projects Konapak and Ameni use a community-based approach in which the community was involved actively in planning and implementation.

A survey on new grid extension areas is planned for early 2012. To reduce costs and implementation time, four known areas are considered. The upgrade potential for the Ameni and Konapak projects and of completed projects (schools and surrounding villages) will be analysed. Technical designs and respective costing shall be developed on the basis of the surveys. The programme plans an overachievement of the grid extension targets to balance anticipated lower numbers in the field of MHP.

### **Project progress (overall progress towards outcome target EnDev 2)**

ICS: Until mid 2011 over 676.000 people in households gained access to ICS cooking through the programme. While stove dissemination continued, from July to December 2011 this was not properly monitored by EnDev because of shortage of staff, a revision of the strategy and a gap in monitoring following from the ending contracts of with NGOs.

The shortage of staff was caused by the team leader resigning and another important team member falling seriously ill so that the remaining team was not able anymore to continue the work as originally planned. It is expected that the expert who fell ill will return soon. In addition, a new head of component has been selected and will take over the position at the same time.

Monitoring of outcomes was also affected by the ending of several grant agreements with NGOs. NGOs, which had provided the data for produced stoves in their region, stopped their monitoring efforts at the end of the contracts. The understaffed EnDev team did not duly extend the agreements or fill the gap in another way.

Spot checks showed that stove builders and NGOs have continued to produce and disseminate stoves. An example is an NGO which has integrated improved cook stoves into the group farming model in which improved nutritional and hygiene practices are enforced. Dissemination is rolling over to new households and maintenance through this approach and replacement is done through existing active stove builders in their community.

However, no exact figure can be derived from the available information and, rather than extrapolating earlier results to remedy this situation, a conservative approach is taken and no new connections are reported.

The team has started to recollect the missing information, data for which will be included in the next monitoring report. Furthermore, the team is working on monitoring systems that will reduce travel time and expenditures. It is envisaged to switch to communication through mobile phones, enabling stove producers to report “real-time”. The modalities for covering the communication costs are under development.

MHP: The two micro hydro power projects are still under construction, effectively implying considerable delays in project implementation. The main cause of delay for the Bwindi MHP project was non-compliance of the contractor resulting in termination of the contract. A senior consultant assessed the technical status of the civil and electrical design in 2011. Several adjustments to the structures were implemented and a design review initiated with the turbine supplier (Ossberger). Recommendations were fully implemented. At present the procurement of a hydraulic control arm is pending to ensure technical feasibility and sustainability of the scheme. In December 2011 the scheme was successfully test-run<sup>10</sup>.

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<sup>10</sup> Until February 2012 adjustments on the electrical components were completed and first customer connections done. End of February the scheme was test-operated for several hours sending power to the lines and the already connected customers. Provided the hydraulic control arm is delivered in time, the scheme will be in full operation by mid 2012.

In the case of Suam micro hydro power project the main cause for delays were heavy rainfalls causing flooding of civil works and obstructing transport of equipment to the construction site. Damages by landslides required repairs. The same senior consultant assessed the technical design of Suam. Based on his recommendations a detailed internal review process was initiated, analysing technical and financial feasibility, cost-benefit ratio and expected impacts. The review process is ongoing. By December civil works and electrical installations were close to completion. The technical team was assessing 5 scenarios to finalize the scheme, considering technical options, budget implications, relevance for target achievement, sustainability, economic feasibility, and impact. The objective is to finalize the project by late 2012.

Together with the BMZ funded GIZ Energy programme, a private sector participation (PSP) approach to promote micro hydro power projects was developed. A close cooperation with the Uganda Energy Credit Capitalization Company (UECCC) and the Private Sector Foundation Uganda (PSFU) has been established and two rounds of calls for proposals were conducted. First potential projects were identified and discussed. Due to long project preparation, the first fully implemented projects are expected by 2013. The PSP approach bears the potential for EnDev for future MHP projects in Uganda to be implemented with and up scaled by the private sector.

A pilot for a pico Hydro component was implemented by a consultancy company, so far resulting in one pico hydro power scheme being installed. Due to impediments in terms of turbine quality and extreme weather conditions during the last rainy season, the scheme commissioned in Khamitsaru (30 people, 1 shop) experienced outages. As a consequence, the other two planned pico hydro power projects are on hold until new and better turbines have been delivered.

PV: Since the start of the programme 579 SHS were sold, out of which 364 can be directly attributed to EnDev 2, accounting for 1,822 persons supplied with solar electricity through EnDev 2. In addition, four schools and 18 health centers were equipped with PV-power.

Until end of 2011 PV market development activities were implemented in cooperation with a consortium of Ugandan and Kenyan consultants. Local and regional expertise is a key to understand and support complex rural market structures. The initial approach for PV market development consisted of working with several solar companies on the basis of local PPPs which sometimes were successful. The project learnt that Kampala based companies show a limited willingness to target rural areas as long as the market in the capital is not saturated. Incorporating experiences from the activities implemented under the EU co-financing, the approach was adjusted and implemented in 2010 by building up a cooperation network with rural dealers and MFIs in the South-Western part of Uganda. Willingness and ability to pay are relatively high there. A baseline and result assessment has been conducted – documents will be made available on the EnDev-Wiki as soon as final versions are available. Indicative results show an improvement against the former approach in terms of people reached and cost-benefit ratio. The project placed strong emphasis on suitable productive uses of solar PV such as phone charging, hair cutting, and refrigeration, public TV screening and secretarial services. This formed an essential part of promotional activities and awareness campaign (e. g. posters, radio ads, fliers, radio talk shows).

Despite the good results achieved with the current approach, the programme is aware of the need to significantly upscale efforts and improve the cost-benefit ratio. Therefore, the programme is diversifying and strengthening the approach continuously. Business and technical trainings proved to be effective as well as promotional and awareness raising activities. In 2012 focus will be on the linkage between solar dealers and MFIs as well as establishment of re-financing mechanisms for solar loans. In addition, discussions are ongoing to enter a PPP with a German solar company's branch in Uganda and options are

assessed for a fee-for-service model. Technologically, the scope will be broadened to include pico PV systems to target a bigger market and different levels of ability to pay. All activities will be developed in accordance with the Lighting Africa quality standards.

Additionally, 80 SI should be electrified with solar PV systems to achieve the set targets. The geographic focus will be in Northern Uganda (West Nile and Lango region). All institutions and districts being contacted before were informed about the upcoming support offered by the programme. Up to now, Memoranda of Understanding (MoUs) were signed with six (6) schools. Out of them five (5) provided the entire agreed financial contribution. Additional schools are in the pipeline of which four (4) provided their financial contribution. Several districts have been approached – partly in cooperation with the Ugandan Office of the Prime Minister (OPM) – to identify health centres and local councils. As pilot district for the cooperation with OPM the district Otuke has been identified – a first scoping mission will be conducted at the beginning of March 2012.

**Grid:** By the end of 2011, 15 persons in 3 households and four schools were connected to the national grid. The two ongoing projects are nearing completion; at least an extra 70 households will get connected early 2012, as they applied at the utility for their connection.

A detailed check of the monitoring sheet revealed a reporting mistake on which the following should be clarified: By May 2011 the Konapak project had been advancing well and the programme expected the customer connections to be done within the upcoming weeks and 78 household connections were reported. Unfortunately, the contractor proved unreliable and disappeared before the 1st connection was made. Only by October 2011 the programme managed to track him and bring him back on site. Since then close supervision of the contractor is done to ensure the project is properly completed<sup>11</sup>.

The same applies for the project at Lwamata Central, where only three households were connected to the grid. The programme is planning to follow-up on the pending household to identify the challenges that beneficiaries are facing preventing them from wiring their houses.

A survey for up to 4 additional such projects will be carried out over the next weeks. The new project areas were identified in a way to ensure implementation can be finalized in 2012. Therefore, the focus is on up-grading existing projects or nearby communities that are well aware of procedures and requirements.

### **Sustainability and handover strategy**

**ICS:** ICS will mainly be supplied by private sector players that have a commercial interest in selling products. A commercially viable supply requires a continuous demand. This demand will be driven by satisfied users acknowledging the benefits of ICSs. Several positive impacts for stove using household have been measured in Uganda before. User satisfaction through these impacts will foster continuous demand for quality stoves. It has been observed that households using ICSs save time and/or money (depending on whether they collect or buy firewood). At least 50% of communities reached with new energy saving technologies are using the stoves and have reduced the time spent for collecting firewood by 25%, while firewood savings are up to 50%. Fewer cases of burns were reported among children. Smoke and particulate matter have reduced greatly. Women have more time to attend community meetings and attend to other productive work for the family. There has been improved kitchen environment and renovation work on the existing kitchen structures. Monetary savings were reported for SI like schools and prisons and SMEs using ICSs or baking ovens.

**MHP:** The two MHP projects are implemented via community-based approaches. A registered company and a community-based organization (CBO) will operate and maintain

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<sup>11</sup> In Feb 2012 the # of new finalised hh connections was 30, another 21 are about to be connected, an additional 20 are pending

the scheme. Tariff structures are developed according to the financial needs for O&M. On governmental level the schemes are handed over to the Rural Electrification Agency (REA), which leases the schemes to the operators.

The MHP approach of Private Sector Participation (PSP Hydro) has a high potential for promoting micro hydro power projects in Uganda. As a purely private sector driven approach, a high level of sustainability and exit-strategy is given. Based on the first projects reaching financial closure and being implemented, the approach shall be assessed and lessons learnt documented. Future EnDev MHP projects should follow the PSP approach.

The technical demonstration of pico hydro power schemes for households will be in the focus for the second half of 2012. Experiences and follow-up will be integrated into the development of an up-scaling strategy work under the BMZ commission until 2014.

PV: The programme follows a sustainable approach focusing on creating markets instead of subsidies for quick target achievements. As mentioned above, the programme is awaiting the final report of the PV market development interventions in 2011. Based on that report the sustainability of created market structures will be assessed.

To cope with the monitoring of the big number of installed SHS a SMS based monitoring system will be piloted early 2012. It is expected that this will reduce monitoring costs and enable the projects and PV companies to get a quick overview about the status of the various systems. Hence, better maintenance service can be provided, resulting in a better market satisfaction, leading to sustainability of the SHS market. During the pilot phase spot checks will be conducted, too. Findings shall be included into the upcoming approaches.

Available information indicates that households and SMEs experience reduced expenditures on paraffin and phone charging. A full impact assessment shall be done at the end of 2012.

A continuous monitoring system has been established in which the Ministry of Energy and Mineral Development is re-visiting supported solar institutions and findings are being documented. Ownership of the institutions is fostered by the requirement of 20% financial contribution. After installation the ownership of and responsibility for PV system is handed over to the institution or the district in charge.

The Ugandan solar company doing the installation is required to ensure after-sales-services and warranty for at least one year. The project also recommends the institutions to open a "solar bank account" to save funds for e.g. replacing batteries and pay for repairs. .

A first impact assessment of health centres shows a positive effect on the reduction of expenditure (paraffin) and offer of night services for emergencies.

Grid: The grid extension projects are based on a solid sustainability and hand-over strategy. Being initiated by community-based approaches, operation and maintenance is the responsibility of the experienced national energy supplier and customers become clients of UMEME.

### **Further information**

The MHP consultant's reports on the micro hydro power projects implemented at Bwindi and Suam are currently being compiled and will be made available soon.

Due to the close alignment with the PVTMA Programme (see above) not 100% of the solar systems can be counted for EnDev Uganda. It has been agreed that one third of the systems sold by the rural dealers supported by EnDev and PVTMA are being reported under EnDev.

EnDev Uganda supports the introduction of PV water pumps for irrigation:

[https://energypedia.info/index.php/File:PV\\_drip\\_irrigation\\_UG\\_short\\_description\\_Oct\\_2010.pdf](https://energypedia.info/index.php/File:PV_drip_irrigation_UG_short_description_Oct_2010.pdf)

EnDev Uganda has implemented a solar lanterns field test. The report can be found here:

[https://energypedia.info/index.php?title=File:GIZ\\_Solar\\_Lamps\\_field\\_Report\\_Uganda\\_Webversion.pdf](https://energypedia.info/index.php?title=File:GIZ_Solar_Lamps_field_Report_Uganda_Webversion.pdf)

Additional information about the cooperation with other donors in Uganda and a compilation of lessons learnt in the field of solar PV market development and the electrification of social institutions can be found under the following links:

[https://energypedia.info/index.php/Rural\\_solar\\_market\\_development\\_-\\_lessons\\_learned\\_from\\_Uganda](https://energypedia.info/index.php/Rural_solar_market_development_-_lessons_learned_from_Uganda)

[https://energypedia.info/index.php/Electrification\\_of\\_social\\_institutions\\_with\\_solar\\_PV\\_-\\_lessons\\_learned\\_from\\_Uganda](https://energypedia.info/index.php/Electrification_of_social_institutions_with_solar_PV_-_lessons_learned_from_Uganda)

## Bangladesh

<b>Promoted Technology</b>	Solar, Stoves			
<b>Project Budget</b>	5,850,000	<b>Spent until reporting date</b>	4,150,000	
<b>Project Period</b>	06.2009 – 12.2012	<b>Reporting Date</b>	12-2011	
<b>Lead Executing Agency</b>	Bangladesh Ministry of Power, Energy and Mineral Resources			
<b>Implementing Partner</b>	Infrastructure Development Company Limited (IDCOL) and 28 private companies (SHS), 37 NGOs (Stoves) in Bangladesh			
<b>Involved Bilateral / Multilateral Programmes</b>	Renewable Energy and Energy Efficiency/ Sustainable Energy for Development – SED (BMZ); GEF, KfW, IDA, GPOBA (DFID), GPOBA (SIDA), ADB, WB through IDCOL			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	687,500	447,623	585,310	people
Cooking Energy for Households	275,000	110,000	184,250	people
Electricity and/or Cooking Energy for social infrastructure				institutions
Energy for productive use/ income generation				SMEs

### Project strategy and key components

EnDev Bangladesh supports the dissemination of **Solar Home Systems (SHS)** and **Small Solar Home Systems (SSHS)** with grants for sales and management through the Infrastructure Development Company Limited (IDCOL). IDCOL is responsible for the overall management of this project and has by now contracted 28 partner organizations to disseminate SHS on a commercial basis. The partner organizations receive result based grants for every unit sold and a refinancing fund, including support for marketing activities and capacity building and measures to ensure high quality of the systems distributed. In remote rural areas, the end-users buy the SHS directly from the partners, mostly in conjunction with hire purchase arrangements.

Furthermore, EnDev intends to introduce PicoPV Systems (solar lamps) on large scale. So far, poor quality systems are dominating the national market spoiling the image of PicoPV systems. EnDev tries to raise awareness for quality through consumer information and systematic introduction of competitive quality PicoPV Systems. A field test is planned to evaluate consumer expectations and preferences of PicoPV as well as to evaluate the supply chain. Based on the results, the project will proceed to establish demand for quality products and sufficient supply of respective products. It is expected that the field test will provide the necessary data to assess the potential size of the market for quality products. Since it will be possible to use existing infrastructure that has already been established during the SHS/SSHS project for dissemination of the systems, there is no need to train technical personnel or establish entirely new schemes. The project will apply the same subsidy scheme which proved to be successful for SHS. Lamps will be eligible for a result based subsidy whose amount depends based on the systems lighting performance parameters. This approach will be adjusted with the development of the market.

In the field of Improved Cook Stoves (ICS), EnDev has facilitated the creation of a nationwide market for ICS, in which potential users purchase stoves from a wide range of suppliers all over the country. EnDev is working with dozens of partner organizations (in most cases NGOs and small companies) who are responsible for the actual installation of domestic and

commercial ICS. The contribution of EnDev comprises training of trainers for stove builders, financial support for the distribution and marketing of ICS, and improvement of quality assurance and monitoring mechanisms. The partner organizations organize technical trainings for ICS manufacturers and disseminate centrally and individually produced promotional materials, collect orders for ICS from the potential customers and assign the orders to the trained manufacturers. Sustainable market development will be supported by additional funds generated by a countrywide Clean Development Mechanism (CDM) project.

### **Project progress (overall progress towards outcome target EnDev 2)**

Since SHS dissemination started in 2003, more than 1,000,000 systems between 10Wp and 130Wp have been sold through the IDCOL distribution scheme with funding from KfW, World Bank, IDB, ADB, GEF and EnDev. EnDev successfully implemented a pilot project to introduce SSHS (10 to 20 Wp) in 2007. As a result, SSHS have been included in the distribution scheme through IDCOL. Around 81,500 SHS and 24,500 SSHS have been disseminated through IDCOL with funding from EnDev 1. Within the current phase, 53,700 SHS and 27,000 SSHS received financial support (at the moment 25\$ buy down grant), meeting the EnDev 2 target. The average sales figures of around 35,000 SHS per month in 2011 indicate that a sustainable and vital market for solar appliances is nearly completely established. EnDev contributed significantly to this sector development. Therefore, EnDev counts 10% of IDCOL's SHS sales since funding was phased out considering that other organisations also contributed with buy down grants to the development of that market. This amounts to 25,000 systems (from a total of 250,000 sold systems) which equals 137,600 additional persons provided with electricity and counted under EnDev. Further support for SHS and SSHS was not planned, but IDCOL indicated now the need for some additional funds for subsidies until end of 2014.

PicoPV activities are currently one year behind schedule. The baseline study, which should provide a better picture of the lighting demands and income situation of poor household, took several months longer than expected due to necessary rework on the report. Parallel, EnDev has been working towards the removal of import taxes on small solar PV products that added up to 150%. Such high taxes prevented high quality products of being imported. It took some time to convince the government to reduce taxes to 35% for all PicoPV systems imported within the framework of the project. Due to these delays the field test, with 4000 lamps was postponed to spring 2012. The Government of Bangladesh is considering to exempt lanterns from tax, if they fulfil certain requirements. Once the field test is completed dealers of eligible lamps will be able to apply for a subsidy. Customers will receive a buy down grant for purchasing high quality solar lamps. Lamps will be offered against cash sales; additionally hire purchase will be available. Pay-back time is estimated to be around 15 months. IDCOL has already indicated to provide refinancing capital if the field test is successful.

The ICS project activities were meant to pave the path for a countrywide market. Within the reporting period 13,500 ICS were constructed by the contracted partner organizations (the last contracts were signed in June 2011) raising the total figure within EnDev 2 to 33,500 stoves (167500 people). Stove efficiency and durability tests were carried out for the concrete stoves. However testing procedures were partly not sufficient for EnDev standard yet, thus outcome figures are reported but only 34.200 people are counted in a sustainable manner. It is assumed that once the market is being fully established the distribution will continue by itself, new stoves will be constructed and the number of households using ICS will increase. A CDM project approved in September 2011 will support this process. As CDM comes with the "additionality clause" the project is not allowed and will not directly fund the installation of stoves anymore (open EnDev contracts of June 2011 will be fulfilled). The funding for new stoves will be provided by JPMorgan.

EnDev initiated the stove sector and was therefore the pioneer for the JPMorgan CDM project. Thus, EnDev will count 25%<sup>12</sup> of all stoves disseminated and accepted under the CDM project for the EnDev period once stove efficiency is sufficiently proven. Depending on market dynamics the initial EnDev target (see Annual Planning 2012) will probably be reached in 2013. Further activities will mostly aim at measures of Capacity Development such as supply chain development, product development, monitoring and quality assurance as well as training of trainers and users in order to stabilize the market.

### **Sustainability and handover strategy**

The monthly sales figures of SHS and SSHS show that a sustainable market is about to be achieved. Several profit-oriented organizations established a nationwide sales network. As a result of EnDev quality standards being established, these standards are now assured by IDCOL which is going to continue its role as facilitator. Demand for SHS is expected to remain high as energy demand in the entire country is increasing faster than the supply. SHS systems are affordable through microfinance schemes and the possibility to pay the systems off in rates. At the same time, the providers have to ensure that the system is maintained during the full loan period. This is usually done together with money collection on a monthly basis. IDCOL staff checks the technically sound installation of a sample of systems and ensures that all maintenance tasks are met appropriately. The service agreement with the providers can be extended by the households for a fee. It seems though, that only few households are willing to pay for this service. The scheme under IDCOL has an in-built annual reduction of subsidies for SHS. According to this scheme, subsidies were supposed to be phased out by end of 2012. However, IDCOL still sees the need for additional funds after 2012 to stabilize the market and increase market penetration of SHS and especially of SSHS (pro poor focus). It asked the donor community to continue their support. Funding for SHS will most likely be extended until end of 2013, funding for SSHS until end of 2014. The institutional development component of the grants (currently 2 Euro per system) will only be paid to new and small partner organizations to further reduce market entry barriers and allow the setup of a dissemination network. EnDev is going to suggest a contribution in the next up scaling proposal.

Similar to SHS/SSHS, the approach for PicoPV is to stimulate the market through a subsidy scheme and to reduce subsidies when the market is taking up. The reduced import taxes for small solar systems disseminated within the frame of the project indicate government support. Furthermore, IDCOL stated to continue PicoPV activities once the technology is proven using its extensive countrywide supplier structure. The breakeven for PicoPV systems (cost savings due to replacement of kerosene) will be below the 2 year warranty period. Assuming a high demand for these systems (compare findings of the baseline study conducted in 2011) a sustainable market can be established within a very short timeframe.

EnDev is phasing out its financial support for ICS dissemination under the current approach, as JPMorgan CDM takes over. The project will be managed by J.P. Morgan Ventures Energy Corporation and be hosted by SZ Consultancy Services Ltd. The crediting period is: 08 Sep 11 - 07 Sep 18. Further EnDev support for capacity development of SZ Consultancy Services Ltd, partner organizations and users as well as stove tests and design trainings will be part of an up scaling proposal.

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<sup>12</sup> EnDev will count at maximum 25% of sales due to its sector development during project duration. Less will be counted according to the contribution of others to the respective sector development

## Indonesia

<b>Promoted Technology</b>	Hydro			
<b>Project Budget</b>	8,000,000 €	<b>Spent until reporting date</b>	4.550.000 €	
<b>Project Period</b>	05.2009 - 12.2013	<b>Reporting Date</b>	12-2011	
<b>Lead Executing Agency</b>	MHP-TSU: Ministry of Home Affairs (MOHA), MHPP <sup>2</sup> : Ministry of Energy and Mineral Resources (MEMR)			
<b>Implementing Partner</b>	Program Nasional Pemberdayaan Masyarakat (PNPM), Operation Wallacea Trust			
<b>Involved Bilateral / Multilateral Programmes</b>	World Bank Multi-Donor Trust Fund, Indonesian-Dutch Energy Working Group/RE Programme			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	90,000	3,956	9,930	People
Cooking Energy for Households				People
Electricity and/or Cooking Energy for social infrastructure	160	31	52	institutions
Energy for productive use/ income generation	290	to be filled in	to be filled	SMEs

### Project Strategy and Key Components

The EnDev2 country measure Indonesia is implemented with the overall objective to support sustainable, rural, off-grid electrification through micro hydro power (MHP). The project comprises two components: (1) The PNPM Micro Hydropower Technical Support Unit (MHP-TSU), and (2) the Mini Hydro Power Project (MHPP<sup>2</sup>).

The MHP-TSU provides technical support to the community empowerment program (pilot) Green-PNPM of the Government, where a World Bank Multi Donor Trust Fund has earmarked investment budgets for MHP in 8 provinces in Sumatra and Sulawesi. Common practice in Indonesia is 100% government investment, but without allocation for sufficient technical supervision and for institutional, technical and socio-economic capacity building for the villagers who own the MHP scheme. The project aims to a) safeguard sustainability of the MHP schemes under the Green-PNPM pilot, b) build capacity for and integrate sustainable (institutional, technical, social, financial) project development into the Green-PNPM system and the involved MHP sector, and c) connect up to 90.000 (revised target for MHP TSU) people through 140-150 off-grid MHP schemes. The Green-PNPM pilot will be closed as planned by the end of 2012.

The MHPP<sup>2</sup> component aims to institutionalize knowledge and experience on the development of sustainable off-grid MHP schemes in the Indonesian sector, with the DG for New and Renewable Energy and Energy Efficiency (DG NREEC) in the Ministry of Energy and Mineral Resources as the main counterpart. This DG is to become a central technical player in the still public investment dominated off-grid MHP sector in Indonesia. Through strengthening its capacity EnDev aims to support the integration of sustainability safeguards in all government MHP investments. From 2012 onwards MHPP<sup>2</sup> aims to extend its activities to supporting other programmes outside the Green PNPM structure to increase the EnDev outcomes. For that matter, MHPP<sup>2</sup> will carry out a planning workshop with DG NREEC and other key stakeholders as a matter of urgency to reaffirm and concretise the goal, targets, roles, activities and indicators.

Since the MHP-TSU is closely linked to the multi donor trust fund, the project is closely coordinating with the other donors involved in the energy sector. Through MHPP2 the project is additionally coordinating its activities with the active Dutch-Indonesian Energy Working Group.

### **Project Progress (overall progress towards outcome target EnDev 2)**

With 9,930 people connected to date the project outcomes seem largely out of balance with expenditures so far, even taking into consideration that the indicators have already been considerably reduced from the original ones (see Annual Report 2012) . The project has experienced major complications since the beginning of the activities which now however seem to have largely been overcome and the project is progressing. The following explains the major problems encountered, actions taken to minimize their effects and expected progress towards the outcomes of the project.

MHP-TSU: the project started up very slowly because Green-PNPM infrastructure was contrary to expectations not in place at the beginning of the project. MHP-TSU, in order to avoid further delay, in the start-up phase assisted MoHA in setting up this structure quickly. Next, the financial allocation within the Green-PNPM system proved challenging in both speed (Gol budget cycle) and equally important volume in terms of number of projects (MoHA as responsible for Green-PNPM allocated annual budgets late and below what could be handled by Green-PNPM and TSU). As a result MHP-TSU became necessarily involved in activities that were not planned for and the number of sites for which investments were made available was lower than anticipated. Additionally, as explained in the Annual Planning 2012, Green-PNPM's selection process (with which the TSU was unavoidably aligned) favours smaller villages and villages with a rather high pre-electrification rate, with household sizes below (4.3) the anticipated 5 people. For these reasons the original target for the TSU component was brought down to maximum 90.000 people.

Currently the project is however on track to reach the revised goals, notwithstanding the relatively low outcomes so far. As the table below shows no less than 116 MHP schemes are still in the pipeline where TSU already has provided considerable support, contributing to the high share of expenditures so far. Since the Green-PNPM pilot is to end by end of 2012 it is decided to scale down the MHP-TSU to the level needed to implement the pipeline only, and reallocate resources to MHPP2.

<b>MHP Scheme Implementation Status</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>Total:</b>
Commissioned	10	1	0	11
Completed	9	0	0	9
Under Construction	5	46	0	51
Approved	0	2	61	63
<b>Total</b>	<b>26</b>	<b>49</b>	<b>61</b>	<b>136</b>

MHPP2: For MHPP2 the biggest challenge was the change of the counterpart from DGEEU to the newly established DGNREEC which took more than one year. As the program strongly depends on a close cooperation with its counterpart a considerable delay was suffered. Now DG NREEC is at full speed and cooperation has strongly improved. MHPP2 strives to conduct weekly consultations with NREEC (a major impediment is the fact that project staff cannot be hosted at the partner offices, which makes regular and spontaneous communication more cumbersome) and seeks to provide general support, guidance and advice regarding renewable energy on a needs basis, such as supporting NREEC's RE programmes (SHS, PV-mini grids).

In 2009/10 the project carried out a stakeholder mapping, analysis and capacity assessment of the MHP sector in Indonesia, followed by the development of a strategy and work plan for support to MEMR. It has adopted 5 areas of intervention for assuring the overall sustainability of MHP based off-grid electrification. Each of the areas has specific activities and indicators: (1) policy advice; (2) M&E; (3) capacity building; (4) pilot projects; and (5) information dissemination.

Considerable progress has been made in the development of a series of tools and pilots in these 5 identified fields, like guidelines on MHP construction and best practices, and on grid interconnection, M&E tools and mechanisms, MHP trainings and a number of pilots on productive use, grid interconnection and power metering. Additionally DG NREEC was supported in the development of a special allocation fund for rural (renewable) electrification and a national SHS programme. Challenge in the remaining project period is to disseminate and further anchor the principles and guidelines of sound MHP development into the Indonesian public and private sector with and through DG NREEC, as well as to reach at least 10.000 - 20.000 direct beneficiaries through technical and institutional support of non Green PNPM Gol investment programmes.

### **Sustainability and Handover Strategy**

Sustainability and handover takes place at two levels. First, at the project (village) level, the technical assistance provided by MHP-TSU focuses on the construction of good quality built, community owned and operated MHP schemes that provide electricity on a sustainable and reliable basis to benefitting villages, with all the necessary skills and capacities in hand of the villagers.

Second, on the program level, many critical lessons from the (MHP-TSU) field are being documented, analysed, and incorporated into a tool box that MHPP<sup>2</sup> uses in its five areas of intervention. The main focus of MHPP<sup>2</sup> throughout, but increasingly after completion of the MHP-TSU, will be to:

1. Strengthen the capacity of the DG NREEC to assume, carry out and supervise the tasks and responsibilities linked to the development and/or rehabilitation of sustainable off-grid MHP and other renewable energy schemes for rural electrification. This will include elements such as quality assurance, clearly defined commitments and village ownership, streamlined procurement, maintenance and operation procedures. Through DG NREEC the awareness of the other key players in the sector will be raised. Direct handing over to MoHA is not considered feasible since rural electrification is not a core function of MoHA. However the GreenPNPM field staff that was capacitated in hydro power by MHP-TSU, and that gained significant experience within the Green Pilot will be absorbed by PNPM rural and will use this knowledge to strengthen the sustainability of the still ongoing PNPM rural MHP projects.

2. With and through DG NREEC, develop or strengthen the institutional capacity of Indonesian stakeholders for the renewable energy based, rural electrification (mainly MHP) as a whole, to ensure that public and private investments in the sector result in rural electrification schemes of high quality and sustainability. This would include key stakeholders such as associations, contractors, consultants and training institutions. For that purpose the following will be developed:

- A range of information materials catering for different stakeholders (best practice guidelines, case studies, etc)
- A set of different hardware and software tools for feasibility assessments and monitoring (calculation spreadsheets, electronic meters, etc)
- A series of training programmes for different stakeholders with related training manuals (operator troubleshooting, quality assurance manual, etc)
- Facilitation of stakeholder interaction through networks and events

3. With and through DG NREEC, support non-Green PNPM programmes in assuring the quality and sustainability of their MHP component in order to meet the EnDev 2 targets.

**Further Information**

[endev-indonesia.or.id/](http://endev-indonesia.or.id/)

[mhpp2.or.id](http://mhpp2.or.id)

[tsu.or.id](http://tsu.or.id)

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## Nepal

<b>Promoted Technology</b>	<b>Hydro/Grid</b>			
<b>Project Budget</b>	<b>1,640,000€</b>	<b>Spent until reporting date</b>	<b>806,440 €</b>	
<b>Project Period</b>	<b>05.2009 – 12.2013</b>	<b>Reporting Date</b>	<b>12.2011</b>	
<b>Lead Executing Agency</b>	<b>Ministry of Energy (MoE)</b>			
<b>Implementing Partner</b>	<b>Grid-extension: Nepalese Energy Authority (NEA) Hydro: Alternative Energy Promotion Centre (AEPC)</b>			
<b>Coordination with bilateral / multilateral Programmes</b>	<b>Nepal Energy Efficiency Programme, Energy Sector (BMZ) Assistance Programme (NORAD/DANIDA), Renewable Energy for Rural Livelihood (WB/UNDP), Donor Coordination Group for Decentralized Renewable Energies, FMO</b>			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
<b>Energy for lighting / electrical appliances in Households</b>	<b>127,427</b>	<b>69,667</b>	<b>85,345</b>	<b>People</b>
<b>Cooking Energy for Households</b>				<b>People</b>
<b>Electricity and/or Cooking Energy for social infrastructure</b>	<b>30</b>	<b>126</b>	<b>192</b>	<b>No. of institutions</b>
<b>Energy for productive use/ income generation</b>	<b>40</b>	<b>196</b>	<b>260</b>	<b>SMEs</b>

### Project strategy and key components

EnDev Nepal consists of two components providing electricity to rural communities:

The first component supports the national Rural Electrification Programme implemented by the national utility (NEA) for grid extension to communities. EnDev had a grant agreement with the utility (NEA) to partially finance the grid-extension to the 49 supported Community Rural Electrification Entities (CREE). The grant agreement is formally closed by now. EnDev provides organisational, technical as well as financial support to the CREEs that manage electricity distribution within the community. Since the CREEs operate the distribution network independently technicians are trained on the operation and maintenance of distribution lines. Furthermore, a training of trainers on electrical safety is offered for local communities. In addition, selected employees of the CREEs are trained on finance and accounting. This knowledge enables CREEs to organize billing and bookkeeping efficiently. The productive use of electricity has been supported by awareness campaigns and recently by a close cooperation with Helvetas Swiss Intercooperation.

The second component supports the efforts of remote communities to be electrified by micro hydropower plants via a credit fund enabling them to pay the high upfront costs over a long period of time and encouraging commercial banks to finance projects in the rural energy sector. EnDev has provided a grant to the Alternative Energy Promotion Centre (AEPC) to set-up the micro hydro power debt fund which is channelled via two commercial banks. EnDev Nepal is closely cooperating with the Nepal Energy Efficiency Programme (NEEP) funded by the German government. EnDev Nepal is taking part in the preparation of the successor project to ESAP, the Rural and Renewable Energy Programme.

### Project progress (overall progress towards outcome target EnDev 2)

Grid Extension: The grid extension component has made substantial progress in 2011. Household have been electrified in 24 communities and construction is in progress in further

25 communities. EnDev focused its activities on speeding up the electrification process, promoting productive use of electricity for rural businesses, detailed monitoring and survey activities in the communities and facilitation between communities, contractors and NEA in case of problems which were delaying the electrification process.

As a result of these activities 85,345 persons (15,180HH) were provided with electricity which exceeded the original project target of 60,602 persons in this component substantially. While electrifying households is the main target for the programme, the communities also use the new electricity for supplying social infrastructure institutions and many small businesses took up the opportunity to use the newly provided electricity. Beside households, 192 social institutions were connected, consisting of mainly schools followed by health posts and local administration. In addition, 260 rural businesses are currently supplied whereby the vast majority consists of rice or maize mills followed by poultry farms and carpentry. During the last reporting period the promotion of productive use was a main issue and cooperation has been agreed upon with Helvetas Swiss Intercooperation. Helvetas promotes enterprises development and employment generation whereby local persons with a business affinity, e.g. small traders, craftsmen, shop keepers etc., are trained for a period of about a year in various entrepreneurial skills. They either extend their existing business in a district or with support of the programme pass on their skills to other potential entrepreneurs. It is planned to extent that approach to electrified communities with a focus on business opportunities with electricity. As a pilot measure, 6 communities were surveyed for potential business opportunities by December 2011.

In December 2011, the project was upscaled with EUR 500,000 and the target number for persons increased to 127,427.

Hydro Power: The tendering process for banks which will act as fund managers has been completed. The winners were the Himalayan Bank and the Clean Energy Development Bank. Each bank receive EUR 0.25 million debt fund, based on a detailed agreement which was signed with AEPC. In cooperation with two regional centres of AEPC an interaction programme was organized and conditions of the debt fund presented. Beside the banks, officials from 43 MHP User Committees did participate. Out of these discussions, the partner banks have completed several inspection visits of existing Micro Hydropower sites in the districts Gorkha, Khotang, Kavre and Okkhaldhunga to decide about lending. In addition, a public notice was issued in the newspaper to inform the public about the availability of the debt fund. To current date around 11 communities have applied for loans to Himalayan Bank and 8 to Clean Energy Development Bank financed by the debt fund. It is expected that the first loan agreements with the User committees will be signed in February 2012 and the first hydropower plants to be constructed until the end of 2012.

### **Sustainability and handover strategy**

Grid Extension: The Nepali government has decided by a cabinet decision to form a separate Rural Electrification Board which is outside the NEA mandate and directly under the Ministry of Energy. If timely implemented, it can be a considerable improvement of the community electrification programme and alongside the existing revolving fund within NEA for communities a real push for sustainability. Meanwhile and in the future the role of NACEUN is crucial and EnDev has continued to support them. Despite its small resources it has been accepted by NEA central office as a partner for community electrification and can continue to lobby and monitor on behalf of the communities even when the project will phase out. As the communities have also invested quite considerable own funding, they will follow up closely that the electrification is carried out as agreed.

Hydro Power: A major part of the concept is the support to the private sector to be able and confident to invest in Micro Hydro Power and show that even in rural areas it can be a profitable business. Once microfinance institutions and banks have gained experience with

MHP lending, it can be expected that they will appraise proposals and provide credit on their own.

## Bolivia

<b>Promoted Technology</b>	Solar/Stoves/Hydro/Grid			
<b>Project Budget</b>	5,400,000 €	<b>Spent until reporting date</b>	3,992,000 €	
<b>Project Period</b>	05.2009 – 12.2012	<b>Reporting Period</b>	12.2012	
<b>Lead Executing Agency</b>	Ministry for Hydrocarbons and Energy, Vice Ministry for Electricity and Renewable Energy			
<b>Implementing Partner</b>	Vice Ministry for Electricity and Renewable Energy, business association, NGOs, municipalities, communities, cooperatives, electricity utilities			
<b>Involved Bilateral / Multilateral Programmes</b>	Programa de Desarrollo Agropecuario Sustentable (PROAGRO), Programa de Apoyo a la Gestión Pública Descentralizada y Lucha contra la Pobreza (PADEP)			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	200,000	86,325	115,025	people
Cooking Energy for Households	77,000	138,035	167,217	people
Electricity and/or Cooking Energy for social infrastructure	1,700	1,501	1,515	institutions
Energy for productive use/ income generation	8,200	5,727	7,438	SMEs

### Project strategy and key components

The strategy of the project continues as previous years, where it tries to mobilize local economic resources with a strong participation of the direct beneficiaries and/or implementing partners at the national, regional or local level. Interventions are demand-driven.

Besides further developing our handover strategy and continuing to co-finance energy access, the project's main activities focus on developing local capacities. The project does this by providing advice and assistance in planning, implementation and monitoring & evaluation to national programs targeting energy access in rural areas. (This includes both current and future programs.) The project strategy also integrates support to and involvement of regional and municipal governments as well as NGOs and the private sector, leading to a considerable mobilisation of funds from these actors.

The project concentrates on the following key components:

- Design of policies and co-financing mechanisms to grant better access to energy.
- Training of and advice to producers/retailers/providers in the provision of innovative modern energy products and services and in opening up markets (stoves, Pico PV, biogas).
- Support of local stove and biogas plant installers as a complementary job creation opportunity.
- Support awareness and public relations campaigns about indoor air pollution, productive energy use, proper use of natural gas and safe domestic electric installations.
- Create and strengthen channels for interaction between micro financing institutions and final beneficiaries.

- Facilitate and support networking between stakeholders in the energy sector, e.g. through workshops and working groups.

All components are integrated into and closely followed by the project's monitoring & evaluation system.

### **Project progress (overall progress towards outcome target EnDev 2)**

The project is now focusing on consolidating the developed strategies within local actors' programs or projects. The intervention concept is similar to former years but with more emphasis on developing capacities in our local counterparts, while retaining the logic of working on demand-driven interventions and at the same time minimizing subsidies per household or per person.

This monitoring includes many installations originally due in June 2011 for the last monitoring. These had not been reported but are now included together with installations that had been scheduled for the second half of 2011 and were installed. This is why the figures in the Energy for Lighting category significantly increased compared to the last monitoring.

A new phase of the national program for improved cook stoves, with which EnDev cooperated closely in 2011, was originally scheduled to begin in 2012, but is now expected to begin in 2013. This made it necessary to adapt the strategy. EnDev-Bolivia is now focusing on strengthening the support to local Malena stove builders.

By December 2011, one year from its scheduled end date, EnDev-Bolivia' stove component has attained more than 167,000 beneficiaries, exceeding by far the final objective (77,000 beneficiaries; due in December 2012). It is planned that an additional 60,000 beneficiaries will benefit from improved stoves in 2012.

The grid densification activities continue to be part of the Supreme Decree 26935 – which makes the EnDev strategy part of a national policy. 28,000 beneficiaries were reached in the second semester of 2011 alone. In 2012, the project expects to attain more than 23,000 additional households with access to electricity.

One aim successfully pursued by EnDev-Bolivia is a growing mobilisation of public funds for energy access: substantial funds from the national budget will be fed into grid densification in 2012 (about 2/3 of the investment), with technical assistance (and the remaining funds) coming from EnDev.

EnDev-Bolivia is also working with its partners in national and provincial governments towards a coherent strategy for Pico-PV lamp dissemination. Two elements of the strategy will be the creation of a market and implication of private actors. The strategy is expected to be finalised in the first half of 2012.

The activities regarding productive uses of energy are moving as planned while focusing in impact-oriented interventions. It is expected that all our biogas activities can be handed over to our partners by mid 2012. In the future, the Public University will be in charge of the Biogas Research centre supported by EnDev and NGO's will continue with the installation and promotion of the polyethylene family sized digesters.

### **Sustainability and handover strategy**

The different components of the project are working with their respective partners in order to achieve sustainability by creating local ownership. EnDev-Bolivia is also working with the key actors of the respective component (national, provincial and local government; NGO's; private sector) in order to maintain and secure the scaling-up and technology transfer.

All know-how, lessons learned and expertise are shared and will be systematized in documents available to the public.

The project has defined suitable handover strategies for each component, all within a same framework but with different perspectives. The following aspects were considered:

- Maintain / increase scaling-up
- Technology transfer
- Subsidy minimization and, eventually, elimination
- Transfer and adjustment of intervention strategies' know-how
- Assessment of national policies, regulations and technical norms
- Market creation
- Awareness creation within counterparts regarding modern energy access.

The project has also started implementing a handover strategy for the Energy for Lighting component. Project staff will do their work (planning and implementation of project activities) from within the Vice Ministry office and will thus coach their technical counterparts in order to anchor the EnDev strategy within the National Policy.

Regarding the biogas component, it is expected to phase out our support by mid-2012. SNV and Hivos are promoting a Biogas National Program based on the EnDev experience and with the use of the polyethylene improved digester that EnDev worked with. It is also expected that other Bolivian NGOs will continue the promotion and installation of bio-digesters, especially within programs related to reduction of water pollution and agricultural development programs.

Activities related to communication, knowledge transfer and networking will play an important part in the first semester of 2012. Workshops will be held concerning impacts reached by EnDev. It is also intended to work on publications explaining the EnDev approach and the specific technical assistance provided by EnDev in different areas.

In the case of the natural gas support, the national oil and gas company (YPFB) has declared the company's full support for social infrastructures that require access to natural gas. This decision was in part based on a small field study carried out by EnDev in 2011. As a first step, around 30 social infrastructures will benefit from equipment donated by YPF until June 2012 (pilot phase).

The project has a fully developed handover strategy. Nonetheless, there is still a huge demand for support of energy access from governmental organizations, private enterprises, civil society organizations and beneficiaries, as EnDev could so far only satisfy for a limited group of partners and regions the financial and capacity development needs. Thus an extension of activities beyond the end 2012 is planned if the budgets are provided.

### **Further Information**

Much additional information can be found on these websites:

- EnDev-Bolivia website: [www.endev-bolivia.org](http://www.endev-bolivia.org)
- National Program "Electricity for a Life in Dignity": <http://www.pevd.gob.bo/sitio>

## Honduras

<b>Promoted Technology</b>	Solar/Stoves/Hydro/Grid/Solar Dryers			
<b>Project Budget</b>	2,630,000 €	<b>Spent until reporting date</b>	1,877,000 €	
<b>Project Period</b>	10.2009 – 12.2012	<b>Reporting Date</b>	12.2011	
<b>Lead Executing Agency</b>	Secretaria Tecnica de Planificación y Cooperation Internacional			
<b>Implementing Partner</b>	Communities, NGOs			
<b>Coordination with bilateral/ multilateral Programmes</b>	Natural Resources and Economic Development Programme			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	14,000	2,527	12,994	people
Cooking Energy for Households	15,300	3,755	17,595	people
Electricity and/or Cooking Energy for social infrastructure	150 <sup>13</sup>	-	121	institutions
Energy for productive use/ income generation	50	4	162	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. Partner organisations have to be present in the communities to be eligible for cooperation. They generally integrate energy issues into rural development processes and the promotion of agricultural and forestry production.

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

- Active participation of community organisations 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.

EnDev-Honduras provides electricity to households, social institutions by grid extension, micro hydro power and solar home systems. The use of energy for productive purposes is supported through solar coffee and cocoa dryers, stoves for indigenous pottery, bread baking and sugar cane processing. Generally EnDev takes over part of the investment costs and provides training. Households have to pay up to 40% of the investment costs of SHS as own contribution. In the case of MHP and grid extension local governments and/or NGOs and EnDev contribute in a specific cost sharing model agreed upon for the specific project. Households contribute with local labour and local materials, transport, etc. EnDev contributions are specific as: posts, or transformers, or turbines and generators.

<sup>13</sup> In the last progress report the figure indicated as "target till project end" was 28,500 people for SI and 11,000 people for productive use. Meanwhile the reporting unit has been transformed from "people" into "institutions". The conversion factor is the average of 119 beneficiaries per SI and 220 per PU, leading to a new outcome figure of 150 institutions and 50 small businesses for EnDev 2, while the outcome itself didn't change.

In the field of energy for cooking EnDev Honduras has improved the “Justa” stove by a cooking board of 16”x24” and other technical innovations in order to improve its efficiency performance. EnDev provides financial incentives for every sold stove that cover up to 50% of the stove costs.

In 2011, EnDev Honduras had grant agreements with the NGO: (a) Hermandad de Honduras for the installation of Solar Home Systems, (b) Asociación Hondureña para el Desarrollo (AHDESA) for Energy Saving Cooking Stoves and (c) Fundación Hondureña de Investigación Agrícola (FHIA) for Three Micro Hydro Stations. Partners coordinate activities in the field and contribute to local technical capacity development. Partners are linked directly with solar and stove providers for further activities without EnDev.

### **Project progress (overall progress towards outcome target EnDev 2)**

Until end of December 2011 a total of 30.589 persons have been benefited during EnDev 2:

- Five grid extension projects with local governments, community organisations and beneficiaries connected 477 households (2.527 persons).
- Solar home systems have been installed in 1.802 households, benefitting 10.467 persons.
- Schools (57), health centers (08) and communal centers (47) gained access to electricity with photovoltaic systems.
- In 3.400 households improved Justa stoves were installed providing 17.595 persons access to healthier cooking facilities.
- Improved Justa stoves were also built in 09 schools, allowing children access to school meals.
- Seven organizations of coffee producers gained access to electricity with photovoltaic systems.
- Solar coffee dryers were installed for 154 cooperatives with a total of 1.292 organised producers.
- A kiln for pottery was installed for a cooperative of indigenous women.

### **PV for households:**

Within the reporting period the installation of 1.700 solar home systems of 30 Wp capacity in various departments of the country, coordinated by the partner organisation “Hermandad de Honduras (NGO)” has been concluded, With this activity 1.582 households, 56 schools, 47 community centers, 08 health centers and 07 cooperatives have been electrified. A total of 9.017 persons gained access to electricity in their households.

An additional 220 households and a school have been electrified with solar home systems of 50 Wp by an activity coordinated by the “Honduran Coffee Producers Organisation – AHPROCAFÉ”. A total of 1.450 persons were benefited.

### **Micro hydro power:**

Based on the evaluation results of 2010, an in depth diagnostic study of all the hydro power sites developed during EnDev 1 has been concluded and specific improvement measures will be taken during the next reporting period, including the installation of electronic load controllers.

The feasibility studies for three new micro hydro sites have been concluded and the sites will be developed during the next reporting period in cooperation with the partner “Honduran Foundation for Agricultural Investigation (FHIA)”. For this purpose a concept is currently worked defining who finances what and in which form. Cost sharing agreements between EnDev, local government and households will be tailored and negotiated to the specific opportunities and options locally available.

### **Improved cooking stoves:**

Within the reporting period cooking boards and chimneys for the construction of 1.659 improved Justa stoves (16"x24") were tendered and the construction of the stoves has been finalized. Stoves were built in 1.650 households, benefitting 8.085 persons; 09 stoves were installed in equal number of schools.

The construction of 750 stoves with the partner organization "Honduran Coffee Institute (IHCAFÉ)" has been concluded. A total of 3.716 persons were benefited.

**Productive use:**

The construction of 150 solar coffee dryers with IHCAFÉ has been concluded within the reporting period, benefitting 145 cooperatives with a total of 945 producers.

A cooperative of indigenous women potters was benefited with an improved kiln for their ceramic production.

**Sustainability and handover strategy**

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. For intensifying capacity development of instructors and participants, technical and didactic course materials have been developed for the installation, operation and maintenance of photovoltaic systems. It is expected that communities and households that benefitted from EnDev activities are able to maintain the access to modern energy services through the gained knowledge.

Capacity development on the local and intermediary level, linking technology providers with local actors and unlocking financing sources are the central issues for enabling the partners to continue after EnDev. With its activities EnDev has strongly contributed to the development of the markets for SHS and improved stoves. Both can be considered as "developed" in the region. However market penetration into remote rural areas is still insufficient. Hereby EnDev and its partners are still playing an important role. If EnDev would withdraw its support and no other donor would step in a significant reduction of activities in remote areas will occur.

**Further Information**

Technical manuals "Microturbinas Hidroeléctricas Axiales", "Manual de Uso y Mantenimiento de la Eco Estufa Justa" and "Manual Práctico: Construyendo la Ecoestufa Justa 16"x24", as well as two videos about the experiences and a series of information leaflets about the results of the project are available as electronic files from EnDev-Honduras.

## Nicaragua

<b>Promoted Technology</b>	Solar/Hydro/Grid			
<b>Project Budget</b>	2,640,000 €	<b>Spent until reporting date</b>	1,581,000 €	
<b>Project Period</b>	10.2009 – 12.2012	<b>Reporting Date</b>	12.2011	
<b>Lead Executing Agency</b>	Ministerio de Energía y Minas (MEM)			
<b>Implementing Partner</b>	MEM, NGOs, communities, private enterprises			
<b>Coordination with bilateral/multilateral Programmes</b>	Sustainable Management of Natural Resources and Strengthening of Entrepreneurial Competencies (BMZ),			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	29,000	10,989	26,323	people
Cooking Energy for Households				people
Electricity and/or Cooking Energy for social infrastructure	110 <sup>14</sup>	48	48	Institutions
Energy for productive use/ income generation	115	71	72	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 hydro power and national grid connected activities. Individual project implementation throughout Nicaragua is accomplished by linking actors as NGOs, local governments and private enterprises with local communities or cooperatives under cost sharing agreements. Partner organisations are trained in technical and organizational aspects for awareness building and capacity development. The key components of the rural electrification activities are the installation and maintenance of renewable energy systems as solar home systems and micro or small hydro power plants. EnDev is providing financing incentives for every installed system. This incentive was gradually reduced from 40% to 18% of the cost of a SHS. Grid densification and extension is pursued in cooperation with MEM and the distribution utilities ENEL and DISNORTE/SUR. EnDev has made or is going to make grant agreements with MEM / National Fund for the Development of the Electric Industry (FODIEN) for the Mini Hydro Plant Wapí (finalised) and another one with MEM/FODIEN for the Grid Densification Plan.

### Project progress (overall progress towards outcome target EnDev 2)

A total of 26.323 persons, 48 social institutions and 72 small and medium enterprises have been electrified during EnDev2 until end of December 2011:

- 940 households have been provided with SHS of 85 Wp (5,452 persons),
- 718 households have been connected to the Salto Molejones Hydro Power Plant in Wapí, RAAS (2,207 persons)

<sup>14</sup> In the last progress report the figure indicated as "target till project end" was 25,000 people for SI and 8,000 people for productive use. Meanwhile the reporting unit has been transformed from "people" into "institutions". The conversion factor is the average of 227 beneficiaries per SI and 70 per PU, leading to a new outcome figure of 110 institutions and 115 small businesses for EnDev 2, while the outcome itself didn't change.

- 3,218 households have been connected by grid extension and grid densification (18,664 persons) and
- 48 social institutions and 72 small and medium enterprises have been electrified.

#### **PV for households:**

In the reporting period 100 additional households (580 persons) have been provided with solar home systems of 85 Wp for household lighting and basic domestic energy applications as radio, TV/DVD and cell phone charging. The coffee processing plant of the Cooperative El Gorrion has been equipped with a photovoltaic system of 300 Wp.

The subsidy rate for the families has been further reduced to 23% (13 EUR) by working with a coffee marketing organisation with access to micro financing.

The majority of the GPS coordinates of the SHS installed during EnDev2 have been processed and incorporated into Google Earth.

A sustainability and impact study of the first SHS installed by EnDev 1 during 2006/2007 was implemented by the Central American University (UCA) The random sample of 152 families out of 400 revealed the following main results:

- After four to five years 92% of the families are still making use of their SHS. The remaining 8% have sold it because of economic necessities, or have lent it to relatives. However, all the systems are still in use for the original purpose and do not reduce the efficiency and outputs of the key intervention.
- Out of all systems in use, 15% of the systems were “not operational” and 13% “partially operational” at the date of the survey. “Not operational” means that a component of the system is failing, like the load controller or the bulbs, and the owners are waiting for the harvest to be able to renew the failing parts. “Partially operational” means, that the system cannot be used fully because of worn out batteries, and the system is only used for TV or cell phone charging during the day, but not for lighting at night.
- 100% of the panels and 81% of the load controllers are technically still in good conditions.
- 35% of the families have changed the batteries for new ones, but 54% of these families still maintain the old batteries in their households.
- 25% of the batteries, 19% of the load controllers and 12% of the inverters must be renewed in 2012.
- 30% of the households have recently been electrified by the grid, although these communities were not included in the electrification schemes planned by MEM in 2006 and 2007. However 74% of these grid electrified households are still maintaining their systems as security back up in case the grid electricity is failing, which seems to be quite common in the area.
- 80% of the users are confirming having received training for the operation and management of the SHS.
- 55% of the users indicate that there is technical support available in case of problems and in 83% of these cases this technical support had been available when needed.
- Based on the daily energy need of the families, the installed capacity of 85 Wp signifies a robust design with sufficient system autonomy.
- The utilization of the SHS has reduced the monthly energy expenditure of the families by 85% mainly by reducing the use of batteries and transport and charging costs for the use of cell phones.
- 95% of the families perceive improvements of the air quality within their households by skipping the kerosene lamps.
- 16% are using the SHS for charging cell phones at a price of up to 0,44 USD per charge and 96% say that they are using the cell phone a lot more often than before.
- 68% say that the study hours of their kids have been extended by the SHS.
- 86% affirm feeling better connected to the outside world by the TV they can run with the SHS.

- 96% affirm that the household chores are far more comfortable to do with the SHS.
- Lighting allows the shop keepers to offer a more attractive service for their customers during evening hours (5%)

The results of the sustainability study will be used for planning and designing battery renewal and recycling campaigns and for further improving local technical support structures until the end of the EnDev programme.

#### **Micro and mini hydro power plants:**

The feasibility of implementing a Pico Hydro Power scheme (PPCH) with pumps as turbines and motors as generators, or site specifically tailored Pico Pelton and Cross Flow turbines of up to 3 KW for power generation and ram pumps for micro irrigation as productive use was investigated with the two most important coffee marketing organizations that can offer micro financing options to the interested families.

With the MHPP Wiwilí of 1,5 MW, the precondition has been provided in cooperation with MEM and Southpole S.A. to include Nicaragua in a Central American Plan of Action (POA) for carbon financing. In case of the successful inclusion of the Wiwilí Project into the POA, a new financing option for any future MHPP project with a capacity of less than 5 MW can be available in Nicaragua.

#### **Grid extension and densification:**

2,540 households in 44 villages (14,732 persons) have been connected to the national grid with internal wiring of the households by the distribution utility ENEL.

#### **Sustainability and handover strategy**

##### **PV for households:**

Sustainability of achieved access and project outcomes is based on a high own contribution of the beneficiaries for the purchase of the solar home systems, training of the families in handling and maintaining the systems and 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.

##### **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 the 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 subsidized tariff structure favoring rural areas and customers.

#### **Further Information**

Two impact studies of rural electrification by mini hydro power plants (MHPP) and grid extension are currently implemented by the Ministry of Energy and Mines (MEM).

## Peru

<b>Promoted Technology</b>	Solar, Stoves, Hydro, Grid			
<b>Project Budget</b>	3,400,000	<b>Spent until reporting date</b>	2.960.271	
<b>Project Period</b>	06/2009 – 12/2012	<b>Reporting Period</b>	12.2011	
<b>Lead Executing Agency</b>	Agencia Peruana de cooperación internacional APCI, Presidencia del consejo de Ministros PCM			
<b>Implementing Partner</b>	Ministry of Energy and Mines, Ministry of Agriculture, Ministry of Health, Support Program for the poorest JUNTOS, Regional Governments, Governments of the Provinces. Private companies especially mining.			
<b>Involved Bilateral / Multilateral Programmes</b>	Microfinance projects of Microenergy International – MEI (Germany) and Appui au Développement Autonome – ADA (Luxemburg)			
<b>Target (Number of beneficiaries)</b>	<b>Target till project end</b>	<b>Achieved till 06/2011</b>	<b>Achieved till reporting date</b>	
Energy for lighting / electrical appliances in Households	100,000	71,960	94,935	people
Cooking Energy for Households	60,000	282,150	494,985 + 1,555 SWH <sup>15</sup>	people
Electricity and/or Cooking Energy for social infrastructure	3,200	1,620	1,567 <sup>16</sup>	institutions
Energy for productive use/ income generation	500	2,024	2,225	SMEs

### Project strategy and key components

EnDev Peru is running a multiple energy access approach comprising grid densification, PicoPV system and clean cook stoves.

In the framework of the rural electrification campaign developed by the Peruvian government, EnDev is supporting grid connections by facilitating safe basic in-house electrical installations. This strategy allows for immediate access to electrical services and at the same time serves as a model for electrification companies and local governments.

The PicoPV component follows a stepwise approach. First step is quality testing of PicoPV systems in the laboratory, followed by field tests of qualified systems. The last step includes support to solar companies offering high quality products to customers and facilitating a sales and maintenance infrastructure in remote areas.

The project line of energy for cooking is implemented in the framework of the “National Campaign of Half a Million Improved Stoves for a Peru without Smoke” and is using two strategies: (1) sustainable scaling-up (mass distribution) of improved stoves, financed through the investment of public resources (2) development of commercial structures, promoting the linkage between the existing supply (developed for the strategy described above) and potential demand to fully purchase improved stoves in the market.

EnDev supports appropriate technologies, like solar water heaters and improved cook stoves for schools, health centres and other social institutions. In cooperation with Microenergy International – MEI (Germany) and Appui au Développement Autonome – ADA (Luxemburg),

<sup>15</sup> Solar water heaters

<sup>16</sup> This reduction (compared to the last monitoring) is the result of a data treatment error introduced during the last monitoring at headquarters. The correct figure for the last monitoring would have been 1,183 institutions instead of 1,620.

EnDev runs a microfinance program for solar water heaters, improved baking ovens and coffee solar dryers with two microfinance institutions in Arequipa and Junín. EnDev cooperates with farmers' associations, by giving them access to higher-capacity technologies which allow members to increase productivity and hence also their individual incomes. In addition to capacity development activities in the different areas, EnDev has made or is going to make grant agreements with the Instituto Trabajo y Familia to import standardised metal combustion chambers.

### **Project progress (overall progress towards outcome target EnDev 2)**

Grid connection: In 2011 EnDev Peru facilitated the connection of 7233 households to the grid. In addition, 450 electricians were trained in in-house electrical installations. 15 local electricity suppliers are currently involved in in-house electrical installations. One regional government has taken up safe installations in its policy.

PicoPV: After an introductory laboratory test of several Pico PV systems, three products (Sundaya, Fosera, and Phocos) were chosen for field tests which are running in three different villages in the department of San Martín. In the framework of the study, 120 systems have been installed in cooperation with the regional energy authority as part of its regional plan of rural electrification with renewable energy.

Clean cooking: The cooking energy component performed very successfully in the last six months, mainly due to support from public institutions that was mobilized within the framework of the "National Campaign of Half a Million Improved Stoves for a Peru without Smoke". Huge commitments were made from public funds while EnDev continued to provide technical assistance.

The improved baking oven developed by EnDev and marketed through a microfinance approach (in cooperation with MEI and ADA) has been adopted by two new suppliers.

The cooperation with the national construction and industrial training institution SENCICO (Servicio Nacional para la Capacitación de la Construcción e Industria) has led to the validation of a short course on improved stoves that has already been included in the institution's curricula. On the other hand, the model of improved stoves without chimneys has been certified by SENCICO for families living in the jungle areas, and a model of improved stoves that simultaneously serves as a heating device is being developed to protect households against the consequences of extreme cold weather in high Andean areas.

In partnership with public and private institutions supporting the improved stoves campaign, EnDev has held workshops promoting a systematic inclusion of gender criteria in the design phase of cook stove projects. In addition, a process was launched with the partners for the creation of a guidebook on proper use and maintenance of improved stoves (planned to be achieved and validated in mid-2012).

The Cayetano Heredia University, specialized in medical and biological sciences, has submitted its report "Before and after the change from traditional stoves to improved Inkawasi-GIZ stoves". The results highlight the beneficial impact on health achieved through the use of improved stoves by households in the department of Apurímac.

EnDev-Peru is currently carrying out a study on the perceived benefits of improved stoves among beneficiaries of the NINA project (national project for improved cookstoves and replacement of kerosene stoves). The NINA project is run by the Ministry of Energy and Mines with technical assistance from EnDev-Peru.

The progress achieved by the Peruvian improved stoves campaign has been highlighted by Le Monde newspaper (France), whose correspondent asked EnDev for information and visited families in the rural areas of the department of Cajamarca. The report was published in November 2011. Recently, the largest and most popular Peruvian newspaper El Comercio – in its weekly magazine Somos – has published an extensive news story on the achievements and challenges of the improved stoves campaign.

Additional activities: One prototype of a 5 kW water turbine has been implemented in Marisol in cooperation with a German developer firm and San Martín's regional energy direction, providing 28 households with access to the local minigrid. The other 24 households in the village are pre-electrified with Pico PV systems.

### **Sustainability and handover strategy**

EnDev ensures sustainability at two levels.

(1) Community level: It aims at strengthening a rural market through qualified providers, whose services offer a certain standard level of quality. In addition, users are informed about good practices and maintenance.

(2) Institutional level: It aims at involving governments, institutions and companies of the electrical, extraction, production, commercial and financial sectors. The level of involvement depends on the strengths of the partner and may include various aspects such as financing, awareness raising, and monitoring.

Access to installed solar water heaters in social infrastructure can only be sustainable if the technology remains operational during and after the cold season in high altitudes (over 2500 m). The market for solar water heaters in Arequipa – with over 30 supply companies – seems promising, as well as in Junín, where three suppliers have entered the market with EnDev's support, bolstering a previously inexistent market for solar water heaters.

One key factor for sustainability of energy access in the productive use sector is that members of the associations are well aware of the impacts of their investment. There are associations that have created a successful experience in this area: in this model, an external person (not part of the association) serves as the manager, directing investment and trading and thus strengthening the association. Other associations and isolated farmers could follow this example in the future.

Preliminary results from the Pico-PV field tests reveal the technical stability of the systems and the complete substitution of Diesel-based lighting devices. (There are no kerosene-based lighting devices since kerosene has been banned in the fight against drugs. Using Diesel for lighting has more harmful effects on health than using kerosene.)

In the course of the "National Campaign of Half a Million Improved Stoves for a Peru without Smoke", the project has demonstrated that improved stoves are a crucial social factor which contributes to overcome poverty and child malnutrition in the country. In this context, different financing mechanisms based on public investment have been identified and developed, so that public organizations can use public resources for stoves in private households.

In order to achieve sustainability of public financing mechanisms through a favourable legal framework, the National Congress is in the process of issuing a law authorizing the use of public resources for improved stoves, safe water, as well as wastewater and solid waste treatment in order to prevent pollution. The executive branch of government has made critical observations to this law. Presently, Congress is solving these issues in order to resubmit the revised text to the executive branch. At the same time, different ministries and regional governments are enacting regulations promoting sustainable access to modern energy sources in many different ways.

Continuing its efforts towards sustainability, EnDev is currently working on strategies to strengthen the supply of energy services throughout all its lines of work. In this context, the German-Peruvian Chamber of Commerce has been persuaded to promote co-financing for three Public Private Partnership (PPP) projects: The first one, in association with the company Corporación Castillo SRL, intends to offer comprehensive services to rural households for safe basic indoor electrical connections. The second project would be developed with the company Comander SAC, in order to enlarge the market for improved stoves among coffee producers with an organic or fair trade certification. The third project involves the company Ecoenergías with the aim of expanding the market for solar water heaters in the department of Junín.

The project has been quite successful and has reached high outcome numbers. However, about 2.5 million households use biomass for cooking. Even taking into account the improved cook stoves implemented by EnDev and other initiatives, more than 2 million households remain without access to modern energy for cooking. The situation is comparable in the energy for lighting category: while there are huge successes, millions of people remain without access. One task for the future would thus be to support the sustainability of the mechanisms and processes created (national strategy on good energy use practices, further strengthening the local market, solidify public finance mechanisms).

### **Further Information**

A comprehensive website, <http://www.cocinasmejoradasperu.org.pe>, collects a multitude of documents, statistics and information about the “National Campaign of Half a Million Improved Stoves for a Peru without Smoke”.

## E Budget allocation and expenditures (as of December 2011)

Out of the total budget of EUR 88,000,000 an amount of EUR 71,370,000 has been allocated to activities in the different countries.

<b>Allocation of EnDev 2 Budget</b>	
allocated to projects based on EnDev 2 Annual Planning	69,190,000
allocated to projects based on EnDev 1 Annual Planning	2,180,000
allocated to program level activities	4,600,000
not allocated	12,030,000
<b>Total</b>	<b>88,000,000</b>

The total expenditures of EnDev II until December 2011 are amounting to 54.199.601 EUR.

<b>Donor funding</b>	<b>EnDev2 Funding</b>	<b>Disbursements</b>
<b>EnDev 2 program</b>	<b>88,000,000</b>	<b>54,199,601</b>
BMZ funds	20,000,000	13,786,354
DGIS funds	68,000,000	40,413,247

<b>Country / activity</b>	<b>EnDev2 Funding</b>	<b>Disbursements</b>
<b>EnDev 2 program</b>	<b>88,000,000</b>	<b>54,199,601</b>
Program management	3,000,000	2,317,245
Grant Agreement Agentschap NL	1,600,000	1,143,602
Kenya	3,300,000	2,538,837
Mali	2,000,000	1,524,555
Senegal	7,200,000	5,841,745
Uganda	4,000,000	3,094,191
Burkina Faso	1,500,000	970,215
Ethiopia	6,830,000	6,530,608
Ghana	900,000	792,107
Mosambique	3,800,000	2,691,598
Rwanda	7,200,000	3,083,269
Benin, stoves	2,000,000	892,585
Burundi	900,000	238,052
Indonesia	8,000,000	4,970,442
Nepal	1,640,000	803,991
Bangladesh	5,850,000	4,166,944
Peru	3,400,000	2,989,474
Bolivia	5,400,000	3,992,481
Honduras	2,630,000	1,915,029
Nicaragua	2,640,000	1,603,461

### Disbursements of projects on 31.12.2011 already approved under EnDev 1

Benin, electrification	1,600,000	1,612,552
Mongolia	580,000	486,618