

RURAL ELECTRIFICATION BY RENEWABLE ENERGIES IN SUB-SAHARAN AFRICA

Best Practices working for success



SCARABÉE n° 19-20

November 2007

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Cover photos by: Rémy Delacloche/Fondation Énergies pour le Monde

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Publisher: Observatoire des Énergies Renouvelables



Printed by: Epel - November 2007.

SCARABÉE n° 19-20, Bulletin of Scarabée network of decentralized energy experts issued by the Fondation Énergies pour le Monde

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GOOD PRACTICES AND INSTRUCTIONS FOR LARGE-SCALE, PERTINENT AND SUSTAINABLE OPERATIONS

2 billion people still depend entirely on muscular strength, animal traction, and traditional energies to feed and warm themselves for lack of access to modern energy services.

Small energy needs that electricity could partially replace, but which have no chance, however, of being met through connection to a national distribution grid before many years to come.

Solar energy, wind power, hydraulic power or biomass, local forms of energy are present to a large extent in the developing countries and constitute a real opportunity to provide rural populations with access to electricity.

Often abundantly available on the sites of use, they present numerous assets. Not only to overcome the constraints linked to the distance away from distribution networks, but also to exploit local resources in an intelligent manner, to reduce equipment operating costs and to create local jobs.

Since they emit little or no greenhouse gases, they also do not contribute to global warming.

A mix of local actors and stakeholders

Commonly called decentralised rural electrification (DRE), the electrification of the countryside covers, even more than urban electrification, a wide mix of different fields and actors.

In addition to the range of technological tools necessary to produce, distribute and make use of electricity, it is a question here of a set of institutional, organisational and financial mechanisms without which no large-scale action can be envisaged.

This also implies a set of services, vectors of social, human and economic development, that call upon men and women of different backgrounds: governments,

elected representatives and traditional authorities, community or private operators, in-the-field actors, financiers, etc., and the inhabitants of the rural world, whose implication and personal involvement is indispensable to ensure the sustainability and evolution of the electrical service.

Permitting access to electricity off the power grid, while at the same time respecting the environment, is a long-term process that requires setting up adapted tools so that users can be satisfied in the long-term.

Knowing local and national contexts, analysing demand, preparing financial schemes, anticipating the roles of each party, as well as training users and operators, and accompanying them in the process, are, in this way, the many stages to be achieved to see a project through to successful conclusion.

But it is also important to develop synergies with similar programs and to exchange know-how to target the realisation of operations on the regional scale, which is the minimum scope to really ensure viability and continuity. Such is the goal and objective of "PROVEN in Rural Africa" and more especially of this brochure.

Yves Maigne,
Director of Fondation Énergies pour le Monde

"PROVEN in Rural Africa" is an initiative of the Fondation Énergies pour le Monde (France) and of the Free Energy Foundation (Netherlands), realised with the support of the European Commission (COOPENER program), the French Agency for Environment and Energy Management (ADEME) and the Regional Agency for the Environment and New Energies (ARENE) of Île-de-France.

I. Introduction

In August 2002, renewable energies were recognised by the highest-level international authorities as an indispensable energy solution for sustainable development, especially in the countries of the South.

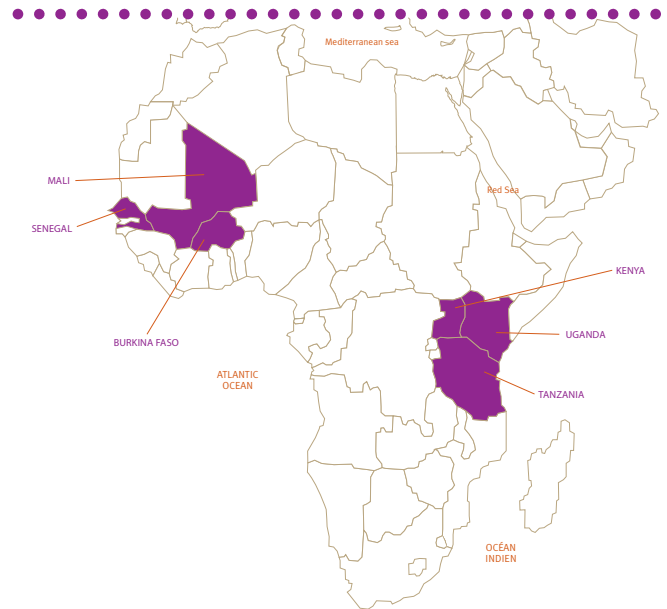
This recognition has been given concrete expression, in particular, by the European Union initiative, “Energy for poverty eradication and sustainable development in the developing countries”. Other initiatives of this type have been launched or are in the process of preparation.

In order for future electricity access operations to benefit from those underway or already completed and to prevent frequently encountered pitfalls, the Fondation Énergies pour le Monde and the Free Energy Foundation have launched the “PROVEN in Rural Africa” program, which is integrated in their public awareness and training activities:

- for the Fondation Énergies pour le Monde, PROVEN is part of Scarabée, an activity dedicated to reinforcing the competences of all the partners of rural electrification making use of renewable energies;
- for the Free Energy Foundation, PROVEN is part of the “Solar.Now” program, which targets reinforcing the competences of private solar photovoltaic energy operators.

PROVEN endeavours to promote access to electricity while at the same time respecting the environment according to modalities whose pertinence has been proven in Sub-Saharan Africa.

Six countries are the object of this work: 3 countries in West Africa: Burkina Faso, Mali and Senegal, and 3 countries in East Africa: Kenya, Uganda and Tanzania.



PROVEN is composed of three sections:

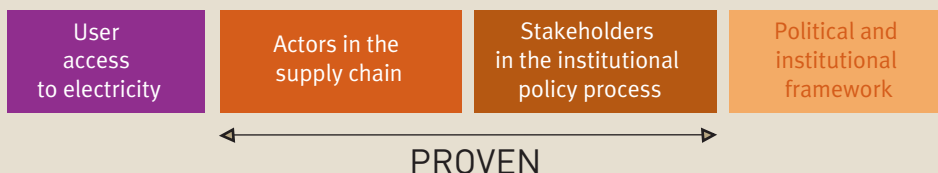
- 1. Exchange of information and data on decentralised rural electrification (DRE) operations using renewable energies having proven their pertinence and viability, and good practices, of which the realisation of the present brochure is a part;**
- 2. Realisation and dissemination of training tools for the different actors involved in access to electricity services in rural areas, technicians, distributors, owners and contracting authorities, investors and backers and sponsors;**
- 3. Training and exchange of targeted data and information: “knowing how”, “knowing what”, “knowing when” and “knowing if”, between actors, political decision-makers and partners influencing the rural electrification process.**

The approach adopted by PROVEN leads to a real reinforcement of the competences of the actors and the stakeholders in the developing countries, whose presence is deemed indispensable for the success of any operation and for the improvement of the living conditions of rural populations:

... THE STAKEHOLDERS that develop policies and influence the conditions and environment of the project: ministries of energy and rural electrification agencies, and of finance, local and territorial authorities, rural development associations, financial backers and sponsors.

... THE ACTORS who intervene in concrete terms in the field: vendors, installers, local banks and credit institutions, user associations, cooperatives, village technicians;

PROVEN is supported by the European Commission (COOPENER program of the DG TREN), the French Agency for Environment and Energy Management (ADEME) and the Regional Agency for the Environment and New Energies (ARENE) of Île-de-France.



II. Good Practices selection methodology

In order to choose 6 “Good Practices” that could well be described and presented, the following methodology was used:

- In each of the 6 countries targeted by PROVEN, a consultant competent in the fields of energy access and renewable energies established a list of rural electrification projects or operations calling upon the use of renewable energies and described them in a brief manner. These inventories are available on the following website:

www.energies-renouvelables.org/proven

- These lists were submitted to a committee composed of national experts from the public and private sectors to select the most representative and most successful operation. The one which, beyond having made access to electricity possible, has contributed to the preparation of a policy favourable to the use of renewable energies and to rural electrification (*see below the list of the persons having participated in the different national committees*).

❖ 4 SELECTION CRITERIA WERE DECIDED UPON:

- Sustainability of the electric service for the users;
 - Impacts of the electricity;
 - Reproducibility of the operation;
 - Effectiveness of the implemented means.
- Once selected, each operation was the object of an in-depth study principally detailing the roles held by its actors and stakeholders, as well as the statutory context that evolved through its contribution.

The presentation of the 6 Good Practices, for the most part calling on the use of solar energy taking into consideration local energy sources and the state of the art of the technologies, permits grasping the modalities and their implementation and to learn lessons likely to facilitate setting up and executing similar operations.

THE EXPERTS CONSULTED FOR SELECTION OF THE “GOOD PRACTICES” PROJECTS

COUNTRY	FUNCTION	ORGANISATION
Burkina Faso Emmanuel NONYARMA Moussa OUATTARA Bassirou OUEDRAOGO Vera DIALLO Emmanuel NANEMA Saliou TALL	Director General of Energy Director of Electricity Dpt Director of Traditional and Renewable energies Head of Renewable energies Dpt Technical Director Head of Planning and Evaluation Dpt	Ministry of Energy Ministry of Energy Ministry of Energy Ministry of Energy Fonds de Développement de l'Électrification Fonds de Développement de l'Électrification
Mali Souleymane DIALLO Seydou KEITA Mohamed TOURE Lanciné SYLLA	Private secretary of the Minister of Energy ex-Director of CNESOLER Director Water – Electricity Director of Energy	Ministry of Energy Ministry of Energy Ministry of Energy Ministry of Energy
Senegal Louis SECK Ousmane Fall SARR Sécou SARR Alassane NIANE Mansour DAHOUENON Bocar Sada SY	Head of Renewable energies Dpt Director of studies Programme manager Adviser of the Minister of Energy Expert at PV/PERACOD/ERSEN Director of SEMIS	Directorate of Energy Agence sénégalaise d'électrification rurale ENDA/TM – Dakar Ministry of Energy Directorate of Energy Semis
Kenya – Uganda Stephen MUTIMBA David WEKESA Jackson Salim MAINA Tameezan wa GATHUI Evans KITSUI David OTIENO Abdallah KYEZIRA Daniel MACHARIA	Managing director Project manager Director of Renewable energies Permanent representative Consultant and lecturer Permanent representative Consultant Permanent representative	ESDAfrica ESDAfrica Directorate of Energy Renewable Dpt ITDG – Practical Action (Nairobi – Kenya) PNUD GTZ – Regional Energie Advisory Konserve Consult Ltd (Kampala – Uganda) IT Power (Nairobi – Kenya)
Tanzania Jan van MONTFORT Cuthbert KIMAMBO Peojin STEEMERS	Director Chairman Manager	Free Energy Foundation Tanzania Solar Energy Association (TASEA) UJL

“Energy Credit” in Burkina Faso

Proposed since July 2002 in the province of Kourittenga of Burkina Faso, “Energy Credit” is a financial modality that permits numerous households to borrow from local banks to purchase photovoltaic kits.



Soré Awa, one of the many energy credit beneficiaries.



Daniel Kadoré, craftsman, satisfied with his 14 Wp kit, which makes it possible for him to run his mechanical workshop more.



Establishment of the financial file.

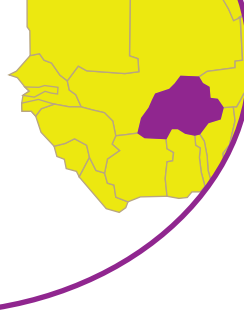
Photovoltaic systems are a pertinent technical solution to meet the demand for energy in this country that benefits from a very high degree of sunshine and with populations in scattered housing.

“Credit Energy” is a financial product adapted to the Burkina Faso populations on the whole with low incomes. Its principle is simple: any photovoltaic acquirer is able to spread out the payment for the systems according to his financial capacities.

Project preparation

The idea of an “Energy Credit” was born in 2001, after an in-depth analysis of the rural electrification market. The province of Kourittenga was chosen as launch site taking a favourable context into consideration.

Proceeding by different stages, the Fondation Energies pour le Monde, the operation promoter, selected, along with the support of the public authorities, a banking partner, the “Réseau des Caisses Populaires du Burkina Faso” (RCPB), a supplier/installer and a public awareness/coordination structure. Numerous coordination meetings then followed to prepare a guide of procedures to facilitate necessary exchanges and prevent any blockage or mutual misunderstanding. A product promotion campaign was carried out associating village meetings and messages on local radio.



Burkina Faso

Population	13.6 millions
GNP/inhab.	400 \$
Area	274 000 km ²
Density of population	50 inhab./km ²
Rate of rural electrification	10%

Once the principle of the Energy Credit had been adopted, a three-year apprenticeship phase followed during which its organisational, technical and financial modalities, especially the modalities of payment, were regularly adjusted and modified.

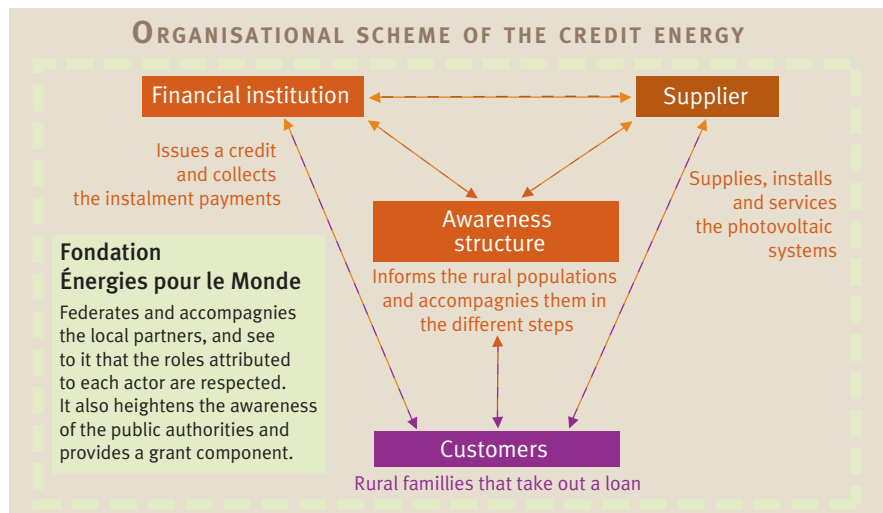
The budget of the operation was €220 000 from 2002 to 2006.

Five years after its elaboration, more than 200 solar kits of 12 Wp to 75 Wp capacity have been purchased, making it possible in this way for more than 2 000 people, in rural as well as peri-urban areas, to have access to electricity services.

In view of this success and of a certain notoriety of the Energy Credit, the actors have decided to widen this financial facility to several other provinces of the country.

Institutional and political environment of the project

The Energy Credit was born without there being any statutory framework for off-grid rural electrification in Burkina Faso. At its conception, it received the backing and support of the “Directorate General for Energy” and the regional authorities, with its objectives being in line with those of the national strategic framework for fighting poverty. Law N° 016-2005/AN of 12 May 2005 on Burkina Faso’s electrical energy procurement



Mr. Emmanuel Nonyarma, Head of Directorate General of Energy: "The success of this project stems not only from the implication of a local credit institution, but also from the financial guarantee that the solar module represents with the banking establishment if ever its acquirer should encounter problems for payment".

specifies that "rural electrification can be managed by non governmental organisations, the Burkina Faso private sector, the territorial authorities and the State". It confirmed that the Energy Credit was in compliance with the statutory framework.

In 2005, the Burkina Faso Ministry of the Economy and Finance committed itself to granting customs exoneration measures for the next ten years in favour of rural electrification that could benefit from the Energy Credit.

Finally, the "Electrification Development Fund", organ created in 2003 to develop the access to electricity, could contribute to enlarging the Energy Credit clientele by granting subsidies.

Roles of the actors

It is through the concerted action of three types of actors that the program was able to come into being:

- the local offices of the RCPB, of Koupela and Pouytenga, in charge of setting up a three-year credit scheme for the purchase of the kits;
- a systems supplier/installer, Oma Senisot, which supplied and installed the solar kits. The firm has a local technician and also offers after-sales service;
- a local structure, BETA, responsible for public awareness and information cam-

paigns concerning the solar kits, as well as local coordination of the program.

Roles of the stakeholders

The Fondation Énergies pour le Monde played the role of catalyser for and unifier of the local partners. Beyond the facility of payment, it contributed a subsidy of approximately 45% of the purchase price of the photovoltaic kits, making the cost of the systems accessible to the largest number and, above all, to the most modest families. The "Réseau des Caisses Populaires du Burkina Faso", central organ of each regional union, validated the financial project and accompanied the local offices delivering the energy credits. It groups together the requests coming from other offices in a view to the extension of the financial product. The "Directorate General of Energy" valida-

ted the concept and brought its support for its implementation. It intervened with the Ministry of Finance for a reduction of the taxes and duties in effect.

Modalities for acquiring a 28 Wp photovoltaic kit

A kit is composed of several elements: panel, regulator and battery, appliances (fluorescent lamps, radio).

- Price of an installed kit: 527€ ● Foundation grant: 233€, i.e. 44%
- Purchase price for the user: 294€ ● Amount of the loan proposed (10% over 3% years): 384€
- Down payment to be paid by the user: 38€ ● Monthly instalments: 11€ per month during 3 years

This kit makes it possible to power 2 fluorescent lamps and a radio for 2 hours a day. Other kits in the offered range can power a television, a sewing machine, etc.

THE LESSONS OF THE PROJECT

FOR THE ACTORS

- The availability of the equipment and the presence of a local technician for installation and maintenance are indispensable.
- The proximity of the offices and the presence of credit agents in the field limit risks of non-payment.
- The implication and the coordination of each party involved are absolutely necessary to overcome misunderstandings. Each party must bring its competence in its proper field of intervention.
- It is indispensable to inform the populations about the capacities, advantages and limits of the solar systems.
- It is necessary to have a coherent organisational set-up, to res-

pect this plan and to show a great degree of flexibility in view to its improvement.

- Continuous training of the in-the-field actors is necessary.
- The backing of national and regional public authorities is necessary to improve effectiveness.

FOR THE STAKEHOLDERS

- It is necessary to overcome the difficulties proper to the launching of an innovative financial product and to show flexibility.
- Mutual confidence must be rapidly established between the stakeholders.

2

An energy services company in Mali

Created by **Électricité de France** and **Nuon International** in May 2001, the energy service company (ESCO), **Yeelen Kura**, sells energy services to the rural populations of the cotton growing area of Koutiala. In a first phase, its services are supported by the use of 43 Wp to 120 Wp photovoltaic systems installed in the houses.



The electrified village of Bla.



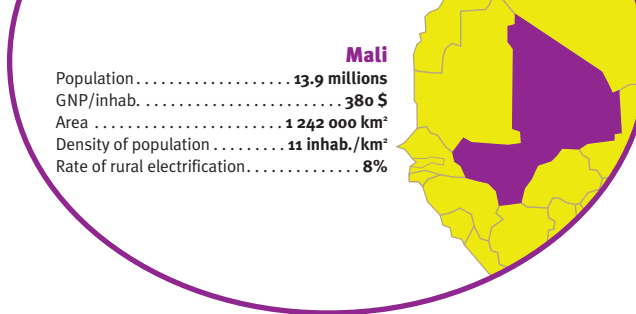
Preparation of a battery box in the ESCO office.



Breeding and domestic customer.



Koutiala police station electrified by the ESCO.



The electrical services that the Yeelen Kura company offers are intended to meet basic domestic needs (lighting, audiovisual, etc.). It also offers these services to health and educational structures as well as to local communities. Since the summer of 2006, it has extended its services to meet productive needs as well for tradesmen and shopkeepers, craftsmen, pumping operations, etc.

The users are bound by contract. They pay a fixed price, which is a function of the service proposed. The basic offer includes access to lighting by means of two light sources. The offer is then widened to include up to three lamps and a connection for radio and colour television.

The payment for the electric service is organised according to two modalities: a connection cost of 17 800 CFA (€27) to 20 900 F CFA (€32) and a monthly subscription of 2 800 CFA (€4.3) to 5 900 F CFA¹ (€9).

It also sells energy in a metered manner (175 F CFA/kWh, i.e. €0.27) for a service that's essentially intended for big customers (notably craftsmen).

After six years of existence, Yeelen Kura counts more than 1 500 clients, i.e. more than 30 000 users and more than 30 Malian employees. Its services are available in 15 local agencies. The ESCO has promised to supply its services for a period of fifteen years.

Project preparation

The ESCO creation program was launched after several electricity access initiatives making it possible to test its innovative concept. In 1997, a feasibility study confirmed the pertinence of the choice of the Koutiala area.

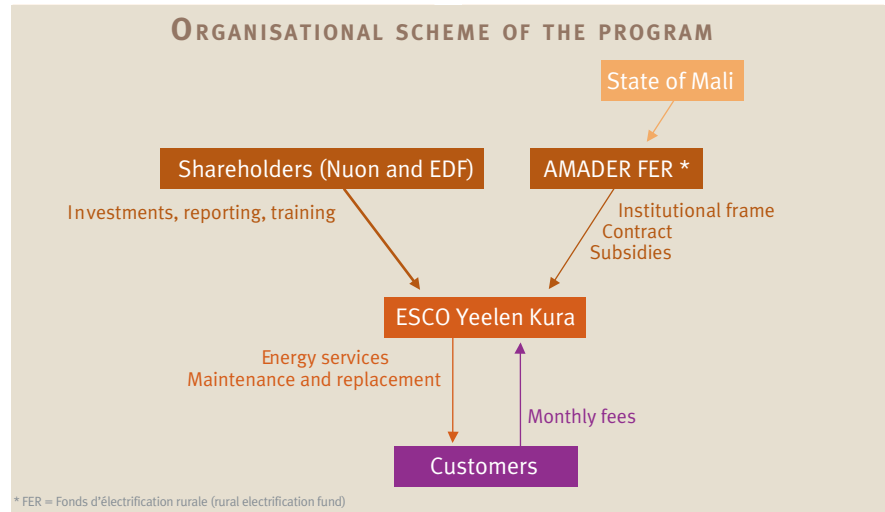
The first period of the program (2001-2005), penalised by unfavourable climatic conditions, by an unattractive tariff context and by an unstable regional situation, nevertheless made it possible for some 1 500 clients to benefit from electricity services.

The initial ESCO financing stems from **Électricité de France**, **Nuon International** and the Dutch government, for a budget of €2 million.

In 2006, an adaptation of tariffs and a decrease in taxes made it possible to target 5 000 clients (nearly 100 000 people).

To supply professional users, the ESCO uses diesel generators and plans to substitute biofuels for diesel oil. It is also preparing to operate a photovoltaic power plant in one of its villages.

ORGANISATIONAL SCHEME OF THE PROGRAM



Mr. Youssouf Sangaré, Manager of the local Koutiala area office: "I have more than 100 clients under my responsibility and they can contact me at any moment. Each month, I have to service the equipment that each one of them possesses."

Project institutional and political environment

Creation of a ESCO contributed to setting up an innovative institutional framework permitting the creation of electrical service companies.

Before this, electrification concerned only the national power company.

The creation of the ESCO also contributed to setting up the "Malian Agency for the Development of Household Energy and Rural Electrification" (AMADER), charged with development of rural electrification and liberalisation of the sector.

On 17 December 2003, the ESCO received an exploitation authorisation (N° 00970) completed by financing agreements for extension of the program in July 2006.

The program extension conforms with the new reference framework set up.

Financing shall come from shareholders and from the AMADER, in the context of its agreements with financial backers and sponsors.

Role of the actor: the Yeelen Koura ESCO

The ESCO established a real strategy on the commercial level. Its electricity access contracts target at the same time the electrical installation, the maintenance and the servicing of the photovoltaic systems and the networks. It also ensures the collection of the monthly fees.

Yeelen Kura is also charged by its two shareholders to mobilise local public authorities and rural electrification actors, so that they can together find financial partners capable of allocating subsidies for the program and to make it evolve according to local needs.

To establish and assure its development, it regularly performs socio-economic studies to ensure the pertinence of its functioning, of its organisation, of its offers of services and of its pricing policy in terms of the populations. Furthermore, it ensures the training and supervision of its agents in the field.

On the technical level, it selects the electrical equipment, performs the installation and carries out servicing. It adapts the supplied service upon customer request.

Roles of the stakeholders

The Malian authorities have been implicated and involved in the ESCO creation process right from the start to ensure that the project is inserted in the local statutory and legal environment.

The approval requests submitted by promoters were studied by the Malian Ministry of Industry so that the project benefits from a favourable investment code system. In this way, the ESCO can benefit from a tax exemption during the first ten years of exploitation. For its part, The Ministry of Finance has authorised exemption of customs duties on equipment imported by the ESCO for a period of twelve years.

The Malian Ministry of Mines and Energy has signed exploitation authorisation agreements for the start-up of the ESCO activities.

Finally, the AMADER has studied the requests of service extension and a participation in its financing which took on concrete form in July 2006.

¹ These tariffs have been applied since the end of 2006, the year that the agreements of extension of the program were signed with the AMADER. Before this, they were approximately 50% higher.

THE LESSONS OF THE PROJECT

FOR THE ACTORS

- A strong implication of the program initiators is necessary at the same time with respect to their general managements and with national authorities, from the presidency of the Republic to the different services of the ministries, in order to see such a large-scale operation reach successful conclusion.
- The adaptation of the ESCO agents with regard to the financial partners, local authorities and clients must be very great in consideration of the innovative aspects of the concept.
- Strong technical support in accounting and management with the operator is necessary.
- The use of components having shown their reliability in difficult climatic conditions is primordial to prevent any disappointments.

- Geographic concentration on a limited perimeter is necessary to reduce the fixed costs inherent to this type of program.

FOR THE STAKEHOLDERS

- The involvement of the different services of the State (Prime Minister, Ministry of Energy and Ministry of Finance) permits the indispensable harmonisation of their respective positions to define a single, clear line of action.
- The capitalisation that entails from such a project is essential to have knowledge of the constraints of time, profitability and image, of an investor and operator.

3

“Energie Solidarité” program in Senegal

The Basse-Casamance is a very hemmed in region in the south of Senegal. Since 1994, it has benefited from a program of electrification through the use of photovoltaic systems to provide health centres and schools with electricity, improving the health and the education of the served population. In view of the good results obtained, this program has been extended to other sectors of activity.



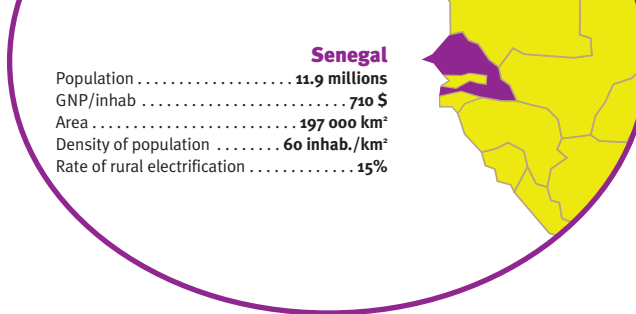
Thanks to electricity, the maternity ward is more effective and successful.



The market garden perimeters were equipped with solar pumps to make it easier to irrigate crops.



Improvement of the health care service and the care of infants.



The program’s objective has been to improve the health care and educational service through high quality lighting, refrigeration and means of communication in dispensaries and schools. To make this access to electricity a long-lasting one, an after-sales service has been set up.

In 1998, a first assessment inventoried forty dispensaries and ten schools equipped with 50 Wp to 300 Wp photovoltaic systems for an overall budget of approximately 200 000.

The operating costs for the electrical systems range from €10 to €22 per month (one-third less than prior budgets for oil lamps, batteries and battery recharges) for a better final service.

1999 marked a new program development with its extension into the field of market gardening. This time, the objective was to improve the dietetic quality of the populations food supply as well as the income of the beneficiaries. Fourteen market garden perimeters, managed by women’s groups, were thus equipped with solar pumps, making it easier to irrigate crops.

In 2007, the totality of the installed photovoltaic systems and solar pumps continue to be operational.

Project preparation

The Fondation Énergies pour le Monde has been the financial backer and coordinator of this program. It’s implementation has been founded on four principles:

- a partnership with all of the stakeholders. Presided over by the Director of Energy of Senegal, a steering committee assembled, in a regular manner, the contracting authorities, the local consultant Semis, the suppliers/installers Buhane et Teisseire and Tenesol Afrique de l’Ouest, the Senegal Directorate General of Energy, the World Health Organisation and the Fondation Énergies pour le Monde.

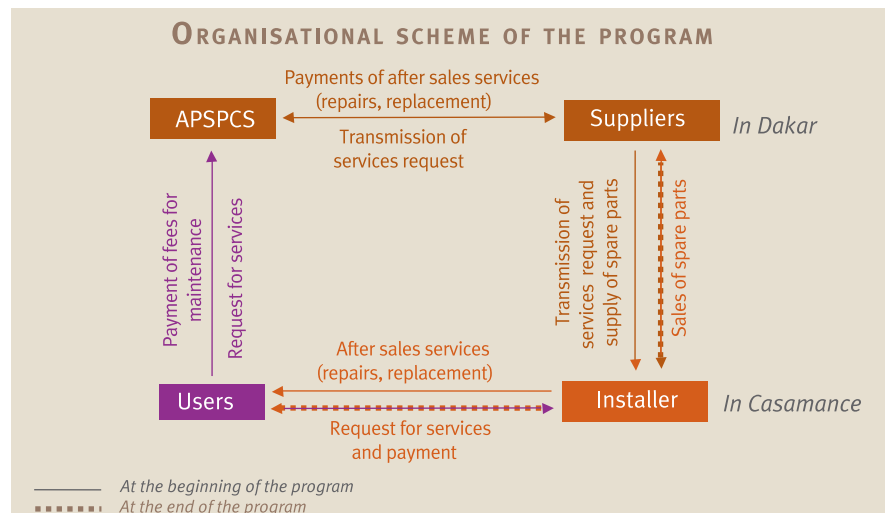
- a concentration of the equipment.

This option facilitated setting up a monitoring and maintenance system.

Particular attention was given to optimisation and dimensioning of the photovoltaic systems used and that of the service offered (including lighting, refrigeration, raising water) so as to reduce operating costs. It permitted each user to cover operating costs and ensure the long-lasting nature of the electrical service.

- a payment for the electricity service.

From the very beginning of the project, it had been agreed upon that the electricity service was to be paid for to ensure covering operating costs and the replacement of components.



Mr. Philémon Badji, pharmacist, responsible for the dispensary and the maternity ward of Balandine. "This program has had considerable impact on the health activities of this city. Since 1994, the number of people using the facilities has considerably increased for both the dispensary and the maternity ward".

In a first stage, the management of the maintenance funds for all of the installations was centralised in Dakar. This option made it possible to take on risks mutually and make the users aware of the importance of savings for replacement of the batteries.

Each user, once convinced of its utility, in a second stage, managed his own operating budget and directly called upon a local service provider.

Project institutional and political environment

In 1994, during the preparation of the program, off the power grid rural electrification and the use of renewable energies was not the object of any statutory framework in Senegal. The implication of the Director of Energy within the project steering committee contributed to the establishment of long-term legislation in the matter.

It was marked by:

- the creation, in 1998, of an agency exclusively dedicated to rural electrification: the Senegal Rural Electrification Agency (ASER);
- a dividing up of the national territory into rural electrification concessions;
- the setting up of additional electrification modalities;
- a taking into consideration of rural electrification as a means of development for rural areas;

- the involvement of the private sector, of NGOs and of local authorities in rural electrification projects.

Roles of the actors

The "Association des Postes de Santé Privés Catholiques du Sénégal" (APSPCS), a group of congregations, and Caritas, a development association, were the two contracting authorities.

These two organisations grouped together the different requests emitted by the dispensaries, schools and women's groups and facilitated the informing, training and accompanying of the users.

At each stage of the project, the local suppliers set up the organisation necessary for a quality installation as well as effective servicing and maintenance.

The stronger and stronger implication of an installer, Faye Solaire, based in Casamance, made it possible to reduce maintenance costs and to intervene rapidly on the sites.

The local consultancy with the financial backer and the contracting authorities was responsible for identifying the centres to be electrified, of informing and increasing public awareness of the users, of setting up a maintenance system and the technical acceptance of the installations.

Roles of the stakeholders

The Fondation Énergies pour le Monde (delegated contracting authority and financial backer) financed the project investment costs after having raised the necessary budget with several financial institutions. It included studies, equipment and accompanying support.

The Direction of Energy of the Ministry of Mines played a moderating role in its function of presidency of the steering committees. It facilitated the coordination and circulation of data between the different partners.

The Senegalese Ministry of Health did not intervene directly in the project, but participated in the national Solar energy and health program, initiated by the World Health Organisation (WHO) in the context of the program.

WHO brought its competence in the field of the conservation of vaccines to the project.

THE LESSONS OF THE PROJECT

FOR THE ACTORS

- The project's concentration on a limited geographical area made it possible to reduce numerous costs (public awareness, feasibility, erection, maintenance).
- The electrical investments were defined to expressly meet the uses of the beneficiaries to limit operating costs.
- The implication of a local installer located near the installations makes it possible to ensure affordable costs and an effective after-sales service.
- The setting up of continuous training sessions for the users made it possible to counterbalance the effects of the rotations of personnel in the dispensaries and schools.

FOR THE STAKEHOLDERS

- The regular dialogue between the stakeholders and the actors permitted anticipating possible problems.
- The contractual relationship with the local actors (research consultancies, suppliers) permitted the durability of the operation.
- The idea of payment for the service, which was innovative at the development of the project, needed to be explained and justified at length.
- A global view of the impacts of electricity made it possible to integrate it in development policies.

4

Pilot rural electrification program using photovoltaic energy in Uganda

This program, set up from 1998 to 2003, was developed in the aim of promoting the use of photovoltaic systems in rural areas. Thanks to the establishment of financial support mechanisms for dealers and acquirers, more than 2 000 individual solar systems have been installed. Once launched, program dynamism is continuing. It is accompanied by a strong institutional commitment.

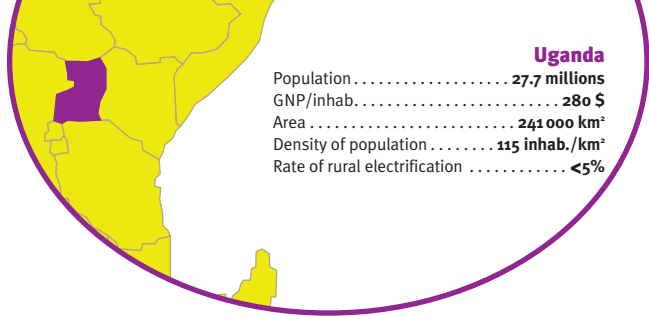
This program laid the foundations for the dissemination of photovoltaic systems in rural areas without access to the national power grid. It also contributed to making the populations aware of greenhouse gas emissions due to the use of wood, lamp petrol and other petrol by-products.

It was made possible thanks to the intervention of local financial institutions, on the one hand, for dealers to have the financial resources necessary to start-up their activities and, on the other hand, for acquirers to spread out the payment for the solar systems.

In five years, this program has:

- reinforced the private sector and permitted it to commercialise photovoltaic systems for individual use.
- provided the public sector with the means to ensure the promotion and inspection of the photovoltaic systems in a normative and statutory framework.

This operation has been the object of financing from the United Nations Development Program (UNDP), trust funds, the Global Environment Facility (GEF) and the Ugandan government for a sum of approximately \$2.5 million.



Project preparation

The Ministry of Energy and Mineral Development chose, in a first phase, to have the financial aid transit through well-known credit institutions. However, these credit institutions were unable to reach the dealers and the public located in rural areas because they did not have rural agencies. A change in approach thus proved to be necessary. It favoured the involvement of small-size, often village scale, banking establishments.

Media campaigns (paper and audiovisual) were numerous as were seminars and demonstrations for the targeted public – whether this be on public markets, in cooperatives or during association meetings. Special attention was given to women.

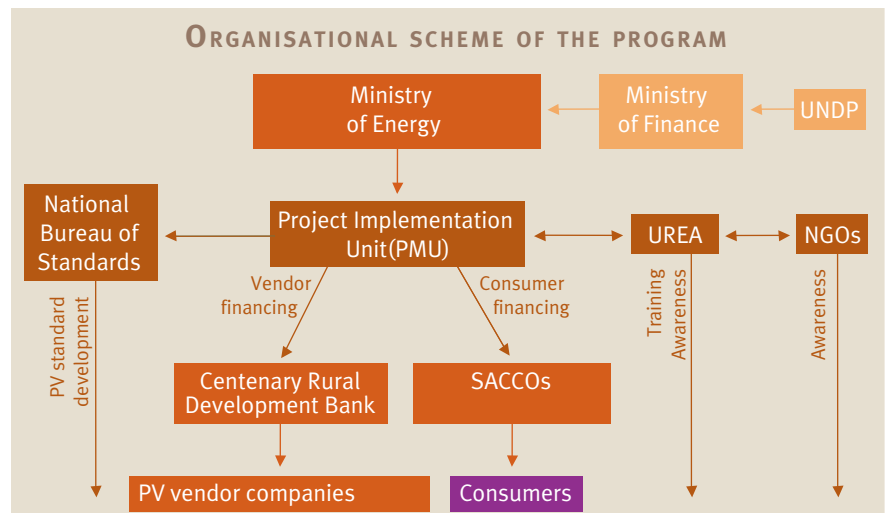
The results of this program have been convincing. An organisation and commercial links were established between the different local entrepreneurs concerning questions of procurement, installation and maintenance of electrical services. Local branches of financing institutions contributed to widening the number of acquirers of solar systems (10 Wp capacity for the most part). Technicians were also hired and then trained in the isolated areas by the dealers to meet installation and maintenance needs.



Lighting in a school.



At a photovoltaic system dealer's.



Richard Kanyike, General Manager of the Solar Energy Uganda company: "It is important for the backers to be in direct relationship with the in-the-field actors who realise concrete actions or with those that have good projects".

Project institutional and political environment

During the preparation of the program, no legislation in terms of rural electrification had yet existed in Uganda. Taxes on photovoltaic systems were high and no financial mechanism had been provided for to support an extension of access to electricity of any sort. On the technical level, no regulations controlled the characteristics of the systems and no rules existed in terms of their installation. Finally, on the organisational level, no banking institution had issued loans or selected beneficiaries for this type of product.

This program has contributed to the development of a national rural electrification strategy. Its objective has been:

- to identify areas that the power grid will not reach in the long term (10 years time) and to identify potential mini-electrical distribution networks;
- to define a system of commercialisation and concession of rural electrical services;
- to determine the different types of subventions to develop renewable energies, and photovoltaic energy in particular.

The operation also contributed to the creation of the Uganda Renewable Energy Association.

Role of the actors

Two types of actors took part in the project process:

- The members of the Uganda Renewable Energy Association, which federates 25 private companies, training organisations and consultants. Most of these companies are of small size, selling and installing photovoltaic systems.

The association's role in the framework of the program has consisted in participating in public awareness activities with the populations concerning the advantages of solar photovoltaic energy. The goal was obviously to then give rise to orders for solar systems.

- The credit establishments:

Thanks to a specific guarantee fund, the Centenary Rural Development Bank (CERUDEB) set up loans with 8 companies wanting to develop their activities in the solar sector. The local savings and credit cooperative banks (SACCO), effective and found near the beneficiaries, provided loans in the form of short-term credits (over 2 years) to the final customers who wanted to spread out the payment to buy a system.

Roles of the stakeholders

The Ministry of Energy and Mineral Development of Ore played a central role in the development of the program through its Rural Electrification Agency (REA).

Committed to the project from its preparation stage, its agents facilitated its implementation, organised the participation of two actors: the private sector principally by means of the Uganda Renewable Energy Association and the village financial institutions.

Moreover, the agents identified and targeted the favourable regions and took part in media promotion of the program.

With the help of the UNDP, the Rural Electrification Agency, which was created during the execution of the program, did not hesitate to make changes in the modalities of the project, when it understood, for example, the limits of the financial mechanism developed in a first phase. It also made it possible for the actors to get moving again and rapidly find an adequate solution.

THE LESSONS OF THE PROJECT

FOR THE ACTORS

- The selection of creditworthy clients made it possible to avoid any serious non-payment incidents.
- The establishment of credits in favour of the most professional of the companies made it possible to avoid any poor performances.
- The presence of local, correctly trained technicians is indispensable to create customer confidence.
- The populations must be informed and made aware of the rights and duties of the borrowers.
- The implication of the Ministry of Finance permitted a reduction of taxation on photovoltaic systems.

FOR THE STAKEHOLDERS

- Flexibility and pragmatism prevented any delays in project implementation.
- The training of the leadership and management of the Ministry of Energy made it possible to develop solar energy through establishment of a rural electrification strategy and encouragement of the private sector.
- The establishment of technical specifications and standards by the National Standards Office made it possible to ensure the quality of the systems and of their installation.

“Solar.Now!”, program for promotion of solar home systems in Tanzania



In Tanzania, a country of low demographic density, domestic photovoltaic systems have a strong potential for development. They are very little known however, and their market and their actors are only little structured. The “Solar.Now!” program has made it possible to create a sustainable market.



The program ensures promotion of the photovoltaic systems.



At a photovoltaic systems dealer's.



The shopkeeper is trained today to advise his clientele.

The principal objectives of the “Solar.Now!” program are to:

- develop the domestic photovoltaic system market by setting up and supporting a distribution network;
- set up tools for promotion, marketing supports, etc.;
- train merchants, technicians and installers in the different facets of their profession.

While “Solar.Now!” encompasses a range of promotion and marketing tools, it is also the name of a brand that distributors and dealers can acquire if they promise to respect quality, price and the supplied service.

This program jointly involved local dealers and distributors. It has incited them to associate together with other sector actors and in particular with credit institutions.

The solar home systems offered by the distributors and dealers are of small capacity (10 to 20 Watts). They can be used for different types of applications (lighting, radio, cellphone charging) and make use of excellent quality components.

Program preparation

From 2004 to 2005, during the preparation of the program, a study was carried out to identify those distributors liable to develop the domestic solar equipment market and to ensure promotion and marketing. This made

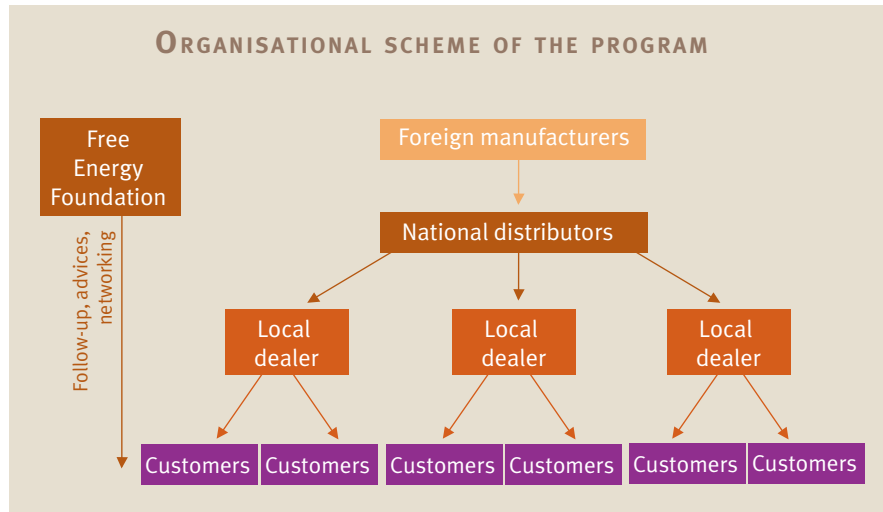
it possible to contact distributors who were ready to build up a stock, to create a dealers network and to ensure the promotion of the product.

In 2006, once the distribution network had been set up, different concrete, simple and inexpensive training sessions were provided in technical fields, in marketing and in sales:

- training sessions in the installation of solar systems, designed for the dealers and their technicians, followed by concrete assistance in the field;
- classes in marketing and sales in order to improve the competences of the dealers and in the management of their stocks. They were provided with methodological tools to increase effectiveness and efficiency.

Emphasis was placed on quality, price, marketing, sales advice, customer relations and after-sales service. Promotion and “tailor made” marketing methods made it possible, moreover, to reach the largest number of customers through radio advertising, on-site demonstrations, discussion visits in the homes of potential customers.

Small companies, hairdressers, shopkeepers, restaurants or cellphone charging, have been particularly targeted, because solar systems are real working tools for them.



Mr. Haji Mussa, shopkeeper in Mbeya, followed a one-week training session on the installation, the size and the dimensioning of photovoltaic systems. Thanks to his new knowledge, he is now able to promote his products with his customers and answer their questions.

Project institutional and political environment

Only 10% of the population, principally urban, is connected to the power grid. Nearly 84% of households still use paraffin as a source of light.

Even so, the government does not have tools to meet the demand for access to electricity.

In a context of disengagement of the government and of stagnation of the extension of the electrical power grid, the rural populations must turn to private actors to provide themselves with electricity and purchase equipment that is either completely mounted or in kit form.

Even today, the most common solution is to buy paraffin, candles and sometimes the recharging of car batteries. A solar home system trade is in the process of emerging due to the exemption from import taxes that solar products benefit from.

Role of the actors

Locally, the Free Energy Foundation, promoter of the project, has several volunteers who participate in the project, under the responsibility of a regional coordinator.

It has established partnerships with national-scale companies: Chloride Exide, Umeme

Jua Ltd., Sollatec Electronics Ltd., Pumps and Solar, and Zara Solar, for example. They import the solar modules and the kits to distribute them to the dealers. These companies have a solid capital and close contacts with European manufacturers. While competition among them is tough with respect to prices, to approved dealers and to the exclusivity of their products, they still all see things in the same way with respect to a good quality and affordable domestic solar systems market that is to grow strongly.

The distributors supply the dealers whose activities cover sale and installation of the electronic components and batteries. The proximity relationship that the dealers maintain with their clientele and the diversity of their stock are their principal trump cards. The local dealers with which the Free Energy Foundation establishes a link on a contractual basis commit themselves in terms of quality, prices, promotion of the solar home systems market and the maintaining of stock.

In return, the dealer benefits from marketing and promotional operations carried out in favour of photovoltaic energy and of the "Solar.Now!" brand. The dealer is also offered communication tools at a very attractive price.

One of the most striking partnerships has been developed with Tunakupesha, a credit institution for state employees. The dealers are paid at the installation of a solar system by Tunakupesha which, in return for a low interest rate, debits, on its side, a series of

monthly payments from the salary of the acquirer.

Role of the stakeholders

The Ministry of Energy and Mines only plays a role of facilitator, mainly being concerned with removing obstacles to the generalisation of access to energy.

In addition, it is partner of the United Nations Development Program (UNDP), Swedish and German development agencies (SIDA and GTZ) and the World Bank, in other projects to disseminate renewable energy applications.

For its part, the Free Energy Foundation has prepared the "Solar.Now!" program and has identified the financial backers, including the most important, the Dutch Ministry of Foreign Affairs. The communication strategies and tools were developed jointly by volunteers in the field and the Foundation leadership.

THE LESSONS OF THE PROJECT

FOR THE ACTORS

- A study of the context is indispensable to identify the potential actors and markets.
- The presence of distributors, capable of constituting a sizeable stock in terms of capital, has played a major role in the success of the project.
- The availability of stocks and the quality of the service, at the level of the local dealers, are the major trump cards for the sale of solar home systems.
- The setting up of a financial mechanism at the service of the dealers developed in association with the specialised institutions is necessary to increase sales.
- The setting up of a sector, with a decrease in cost prices and the

improvement of the services offered – is the condition for market growth.

- The development of the private sector is an indispensable condition for the development of renewable energies.
- The links built up between suppliers, distributors, dealers and technicians are precious and sources of synergy that benefit all of the parties involved.

FOR THE STAKEHOLDERS

- The tax reduction or exemption is one of the tools necessary for the establishment of a renewable energies market.
- The implication of international financial backers is indispensable for the emergence of a renewable energies market.

Two picohydro projects in Kenya

Launched in 2001 by Nottingham Trent University (England), this program has not only permitted the installation of two picohydro plants, benefiting 175 families of the isolated villages of Kathamba and Thima, but also to train local craftsmen and entrepreneurs in the fabrication of small turbines.



Installation of electric posts in Kathamba.



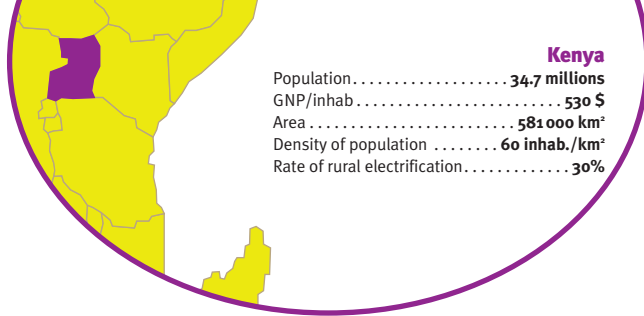
First night with electricity in Kathamba.



Installation of the turbine (Kathamba).



Installation of the water reservoir in Kathamba.



This program has targeted proving the pertinence of pico hydro plants (<5 kW) to meet the electricity needs of rural communities of Sub-Saharan Africa, from a technical as well as from a financial point of view.

The villages of Kathamba and Thima, in the centre of Kenya, have been equipped with turbines of a respective capacity of 2.2 kW and 1.1 kW. In total, 175 households were connected to the power plants in 2002. In 2007, the two units still continue to function.

Financing of the equipment, representing approximately €10 000, was ensured by the European Commission. The beneficiaries ensured, by their contribution, all of the work involved.

Program preparation

The program was directed locally by the NGO Practical Action (ex-ITDG – Intermediate Technology Development Group) and Nottingham Trent University (NTU). They developed the operational organisation of the operation.

After evaluation of the market to identify barriers to the development of hydroelectric picopower plants and a study of the strategies to be set up, the sites of Thima and Kathamba were selected from among 14

others. The selection criteria were: technical feasibility, facility of access, benefit for the local community, management of the exploitation structure and local contribution to the project.

The installation of the two units took place between July and December 2001 with the participation of the local population.

Depending on the site, 2 or 3 levels of service, corresponding to available capacities of from 10 to 30 Watts were offered, at a cost of \$0.70 to \$2.60 per month.

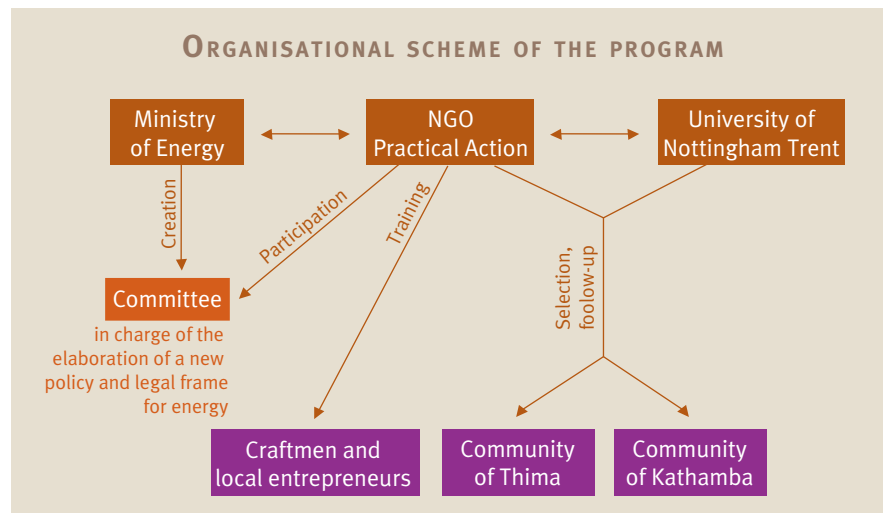
Once the inspection of the performances had been carried out, the responsible technicians have ensured the maintenance of the installations.

The NGO and the Ministry of Energy then ensured an accompanying action for the management committees.

Project institutional and political environment

At project launch in 2001, a rough outline of energy policy had begun to see the light of day at the Ministry of Energy. The Ministry approved three projects to show its overture to dialogue on this matter. These three projects were the picohydro plant projects of Thima, Kathamba and Tungu Kabiri, selected because they were perfectly representative of the local context and liable to give rise to the establishment of a statutory framework in terms of decentralised energy systems and rural development.

ORGANISATIONAL SCHEME OF THE PROGRAM



Mr. Francis Mwai Mbogo, President of the Kathamba management committee: "We discovered that keeping our account books up to date made it possible to convince the members that the project was being satisfactorily managed. Because of this, it also made it easier to be strict in terms of the settlement of payments".

This program has contributed to the drafting of different articles of the law promulgated in 2006 called the "Electric Power Act". It permits persons or communities of persons to produce and operate electricity systems with capacities lower than 3 MW.

Role of the actors

The NGO "Practical Action", the principal actor:

- evaluated the market for picohydro plants in Kenya;
- organised training sessions for the technicians of the local companies manufacturing the picohydro plant components. Rodson Electronics, a local firm, in this way manufactured the controller;
- established and organised, with the Nottingham Trent University, a network of information and exchange on picohydro plant technology;
- designed a guide for development of picohydro plant programs in Sub-Saharan Africa;
- selected, with NTU, the two sites and their communities (Thima and Kathamba);
- realised, with NTU, a socio-economic and environmental impact study of the project on the communities.

For its part, the NGO was asked by the ministry, as organiser of the program, to take part in the committee in charge of developing a new energy policy and legislation.

The two village communities, owners of the equipment, have become actors as the project was implemented and they set up committees for monitoring and collecting the necessary funds. They played an active role in the civil engineering work (labor and building material) and in the installation of the distribution posts and the connection cables. Maintenance technicians and administrative agents are appointed by the committees.

At present, the two infrastructures are under the responsibility of the village management committee which looks after its correct functioning as well as its future expansion.

Role of the stakeholders

The major stakeholders are the Kenya Ministry of Energy and the Microhydraulic Power Centre of the University of Nottingham Trent.

The Ministry of Energy used these two projects to inform public opinion that a political concertation was underway to result in a legislative text facilitating the installation and exploitation of small energy systems.

Engaged in the project right from the start, the Ministry of Energy has been able to benefit greatly from the project to increase its competences.

Nottingham Trent University:

- created an information and exchange network on picohydro plant technology;
- took part in the selection of the two sites as well as of their communities (Thima and Kathamba).
- participated in the realisation of a socio-economic and environmental impact study of the project on the local communities.

THE LESSONS OF THE PROJECT

FOR THE ACTORS

- It is indispensable to involve the community to present the principal aspects of the project and then to measure its benefits.
- Regular meetings with the community make it possible to ensure program advancement or progress in resolving difficulties.
- The accompanying of the communities in view to a later extension of the project is necessary.
- The detailed estimate of needs must be made so as to avoid future disagreements.
- The sizing of the systems must be based on the period of the lowest level of the energy resource.
- When a private operator is not available, a village structure must be constituted to operate the system and accompanied

in order for it to become competent and effective in all the different jobs and aspects of the project.

FOR THE STAKEHOLDERS

- The governmental structures of the electricity sector must be involved and given responsibilities in the different stages of the project.
- A close collaboration with the different concerned ministerial departments must be carried on.
- The education of the consumers in the rational use of energy and in the rules of safety is primordial.
- Coercive measures in the case of theft of electricity must be agreed upon, accepted and applied.
- The creation of viable business firms must be encouraged to constitute a real renewable energy activity sector.

GENERAL LESSONS LEARNED FROM THE 6 GOOD PRACTICES

❖ For the stakeholders

DURING CONCEPTION OF THE OPERATIONS

- It is necessary to concentrate the operations on a zone with a favourable context to reduce development and operating costs, and then to design extensions by later spreading out and gaining ground.
- The access to electricity must be integrated in multi-sector rural development strategies. This must make it possible to increase the impact.
- The implication of all the parties involved (initiators, Directorates of Energy, elected officials of the local villages, private sector, etc.) and their coordination are absolutely necessary to be able to overcome possible misunderstandings. Each party must bring its own specific expertise to the project.
- The implication and contract-based relationships with the local actors (consultancies, suppliers, installers) is indispensable to ensure the long-term aspect of any operation.
- A relationship of confidence must be quickly established between the stakeholders in order to resolve questions in a collective manner. It is preferable that, per type of stakeholders, a single person monitors an operation from start to finish.
- As soon as an operation is prepared, it is indispensable that all the local stakeholders be made aware of the assets and limits of renewable energies.
- As in any rural electrification operation, the investment cost must be taken on for the most part by the State or by actors of an international cooperation program.
- The electricity service must be paid for in order to cover servicing, replacement of components at failure and their replacement. The amount of the fees must be adapted to the payment capacity of the users.
- An adapted tax system, principally a reduction of customs duties and VAT, must be obtained to facilitate the use of local energy sources.
- Environmental protection measures must be prepared, principally for management of the batteries.
- Indicators must be set up to measure the impact of the operation.

WHILE THE OPERATIONS ARE BEING FULFILLED

- The regular dialogue between the stakeholders and the actors in the field permit, through a knowledge of local contexts and of their evolution, anticipating possible difficulties or blockages.
- Pragmatism and flexibility prevent pursuing the execution of an operation on unsuitable bases.

These Six Good Practices show the importance of the quality and the willpower of the actors and the stakeholders, of their aptitude to dialogue and to negotiate together. They also show the necessary emergence of an adapted statutory and institutional framework, giving confidence to all the protagonists for legitimate risk-taking. The rural world, because of its difficulty of access, its resources varying according to the seasons, its specific customs and habits depending upon ethnic groups and regions, is a difficult context. Analysis of the 6 Good Practices is rich in lessons to be shared. Actors and stakeholders will find the keys for the success of new large-scale operations.

••••• For the actors

AT CONCEPTION OF THE OPERATIONS

- The actors in the field, economic and rural development structures, associations and credit institutions must participate in the mounting of the projects. Their knowledge of the local economic and sociological context is essential.
- The local private sector (suppliers, installers, etc.) must be implicated to the greatest degree possible. This is a condition for development of renewable energies.

DURING THE FULFILMENT OF THE OPERATIONS

- The actors must inform the populations about the capacities, assets and limits of electrical systems making use of renewable energies. A constraint must incite the user to save energy.
- They must also make the users aware of the rules of safety relative to the energy and advise them in the purchase of electrical equipment (lamps, TV, radio, etc.).
- The rights and the duties of the actors and the users must be known to all. The mechanisms to ensure that they are respected must be established by mutual commitments.
- The payment of the electrical service must be regular, seeing how difficult it is to get debts paid.
- The local actors (distributors, vendors, installers) must be trained in technical fields, in accounting and in management in order to become specialists.
- They must have competent technicians and spare parts close to the users.
- Maintenance must be structured. Its modalities must be explicit and coherent.
- The respect of existing specifications and standards permits ensuring the quality of the systems and the respect of correct, professional working practices for their installation.
- The use of components having proven their reliability in difficult climatic conditions is primordial to avoid rapid deterioration and failures.
- The rotation of the involved persons must be prevented so as to respect the modalities of the operation. If this is not possible, a training session must be foreseen each time that a person in a position of responsibility changes.

LESSONS AND SUGGESTIONS ACCORDING TO THE RURAL ELECTRICITY SUPPLY MODEL

The conditions for success of the “Service” approach.

In this approach, analysis of the demand is necessary when designing the systems adapted to the local context. The communities of users must be involved right from the launch of the project in order to understand the different assets and constraints.

The modalities of exploitation and management, the setting of prices, the training of the technical and administrative personnel must be defined precisely in order to ensure the continuity of the electrical service.

Adaptation of statutory texts can be necessary with regard to the exploitation of the equipment by private companies or by user associations and the ownership system of the electrical infrastructures.

Investment must be for the most part covered by outside financing, with the operating costs remaining at the expense of the users themselves for social applications (health centres, schools, administrative buildings).

The specific lessons, drawn from the Good Practices, are the following:

For the stakeholders

- It is indispensable to involve the beneficiary communities and present to them the main aspects of the project: technologies used and their limits, precautions in the use of the electricity, payment for the service, rights and duties.
- The detailed estimate of demand must be made in order to prevent later disagreements.
- The implication of the different State services (Prime Minister, Ministry of Energy and Ministry of Finance) permits the indispensable harmonisation of their respective positions in order to define a single and clear line of action.
- The notion of fee for service, still innovative in rural areas, needs to be justified and explained at length. A global view of the impacts of the electricity makes it possible to integrate it in development policies.
- The accompanying of the leadership and management of the Ministry of Energy in the establishing of a rural electrification strategy facilitates the wide and commonplace use of renewable energies.
- The capitalisation that ensues from a renewable energies development project is essential. It permits knowing the constraints of time, profitability and image, of an investor or an operator.
- The accompanying of the beneficiary communities in view to a later extension of the project is necessary. It makes it possible to meet the evolution of electricity consumptions, a sign of local economic and social development.

For the actors

- The exploiting parties, whether private or associative, must acquire a perfect professionalism in the different facets of their functions, technical, commercial and managerial.
- The fee for electricity service requires coercive measures that are known, accepted and applied for all, in the case of theft of electricity, late payments or non payments.
- The implication of the regional and national government authorities is necessary to facilitate the settling of possible disputes.
- The electricity systems must be sized to meet the demand of the beneficiaries. The amount of the operating costs must be within their capacities of payment.

PREREQUISITE QUESTIONS FOR A SERVICE APPROACH

- Will the electricity service be viable in the long term?
- Will the tariff be acceptable by a significant part of the population?
- Will the relations between the contracting authority, the operator and the users be clear and precise so that the conditions of use of the systems are respected?
- Can an exploitation/management structure be easily created? Will it be able to be rapidly professionalized?
- Is the method of electrification that respects the environment the least expensive?
- Do financial partners exist to cover the investment costs?

Two principal approaches to rural electrification with the use of renewable energies can be drawn from analysis of the Six Good Practices:
 The first considers electrification as a **service**, this is the case of the operations in Senegal, Mali and Kenya.
 The second considers it as a **market**, this is the case of the operations in Burkina Faso, Uganda and Tanzania.

The conditions for success of the “Market” approach.

The electricity is considered as a product that it is necessary to promote, sell and repair. In a first phase, the clientele is the well-to-do rural population and the use of credit must then make it possible to widen this user population. To satisfy it, it is necessary to train local dealers in marketing, in management of stocks, in customer relations, in installation and maintenance, in order that, near to the customers, they know how to convince and satisfy them. In this way, the promotion of the quality of the products and of the service is something primordial. The relationships between national distributors and local dealers, and then with the credit institutions, must be facilitated to take into consideration their respective constraints of funds and responsibility. If the purchasers are owners of the systems, a strong public awareness campaign must be carried out on the correct use of the batteries that must be regularly renewed.

The specific lessons, drawn from the Good Practices, are the following:

For the stakeholders

- A detailed marketing study is indispensable to understand the clientele and its demand.
- The setting up of modalities of credit and/or a subsidy permits increasing the sales volumes of systems using renewable energies.
- Repeated information campaigns must be conducted with the rural populations to inform them in terms of both the decentralised systems and the possible financial product.
- A range of products must be offered to reach a population with different capacities of payment and debt.
- The unavoidable difficulties encountered at the launching of an innovative financial product must be overcome and flexibility must be exerted before a significant sales volume can be reached.
- Back-up support for coordination of the actors, distributor, bank, public awareness organisation, is necessary to ensure the correct cohesion of the services provided by each one of them. Regular training must be provided.

For the actors

- The presence of distributors able to constitute sizeable stocks is indispensable.
- The rapidity of delivery and the quality of the service are necessary to satisfy the customers.
- The distributors and the dealers must be trained to acquire an irreproachable professionalism.
- The proximity of the credit institutions and the presence of credit agents in the field permit making the clientele better aware of the questions of credit as well as to limit risks of outstanding payments.
- The selection, by the credit institutions, of solvent customers prevents any serious payment incidents.
- A reduced gross margin of the distributors, suppliers, dealers, etc. and the continual improvement of the service provided are the conditions for market growth.

PREREQUISITE QUESTIONS FOR A MARKET APPROACH

- Are there enough national distributors and local dealers interested by the sale of renewable energy systems, ready to accept a long-term investment, limited turnover and reduced margin rates?
- Is it possible to avoid dumping, false competition and/or monopolies?
- Will the prices be acceptable for a rural clientele, will the credit mechanisms be able to be set up?
- Will a reasonable level of stock be maintained by the distributor and by the local dealers?

