

Grant agreement No. EIE/06/248/SI2.448127



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## Intelligent Energy – Europe (IEE) COOPENER

Acronym **RENDEV**

Title **Reinforcing provision of sustainable ENergy services in Bangladesh and Indonesia for Poverty alleviation and sustainable DEVELOPMENT**

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## D22 – Final Strategy Paper

### BANGLADESH

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WP6:

Date of submission      date

Organization and responsible of the deliverable:

*PlaNNet Finance – Pascale Geslain*

Date of start of the project:      01 / 01 / 2007

Duration:      36 months

Organization and responsible of the deliverable:

*PlaNNet Finance / Pascale Geslain*



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## D22 Final Strategy Paper

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The project "Reinforcing provision of sustainable ENergy services in Bangladesh and Indonesia for Poverty alleviation and sustainable DEvelopment (RENDEV)" is supported by the European Commission through the EIE programme (Grant agreement no. EIE/06/248).

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## The RENDEV project

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The RENDEV project aims to explore ways to link microfinance and access to renewable energy, bringing a positive contribution in rural development and poverty alleviation in Bangladesh and Indonesia by increasing access to solar energy, the development of micro enterprise, and the provision of microfinance mechanisms tailored for low income people's needs.

The project started in January 2007 and will last until December 2009. RENDEV is financed by the European Commission under its Intelligent Energy line.

*The main objectives of the RENDEV project are:*

-  To promote development of income generating activities with renewable energy supply;
-  To identify measures justifying involvement of Small and Medium Sized Enterprises in the solar energy sector;
-  To build synergies between the microfinance sector, the renewable energy sector and the micro enterprises in Bangladesh and Indonesia;
-  To better inform stakeholders providing pro-poor sustainable renewable energy services;
-  To bring a positive impact on the quality of life in rural districts.

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## Executive Summary

Solar PV has reached a large part of the rural population of Bangladesh within the past 10 years with the introduction of national SHS program being implemented in the country. On the average 12,000 SHS are currently being installed per month in the rural sector through 15 partner organizations of IDCOL, which has streamlined the marketing, financial and technical models<sup>123</sup> developed in period of 1998 to 2001. The widespread presence of NGOs typically engaged in various rural programs, where micro-credit is disbursed in particular, is an advantage for this rapid dissemination of SHS. Micro-financing of SHS to rural households has therefore been successful under the program being funded with IDA funds of the World Bank, KfW, GTZ and others.

This study reveals that the unmet demand of electrification among the lower income poor households can be satisfied with a few targeted solar electrified appliances. The mainstream products currently being marketed cater to the middle and higher income population. Considering the high upfront cost, the SHSs are still beyond the affordability of most of the rural people of Bangladesh. Very few households can purchase them with cash. Selective provision of low cost solar electrification options will become popular to this income group who are willing to spend about 300 Taka per month for lighting by substituting their current cost for kerosene wick lamps and lanterns. Local production of such amenities can be a possible solution to be reached. Current growth of solar hardware suppliers in the country indicates that the market potential is high. More NGOs can be encouraged to participate in dissemination of solar appliances among the nearly 100 million un-electrified populations. It is also expected that some of the future systems will be scaled down to cater to lower income households as well.

Under these circumstances, possibility of payment on installments under the Government's RERED project implemented by IDCOL has proved to be a very strong instrument in making SHS attractive to the rural people. Since 2002, the GOB has supported the national solar program of IDCOL, which has produced the most successful off-grid electrification scheme in the country. Due to the high level of investment needed, mostly higher income households can purchase the typical models of SHS with cash or credit.

***Although a very attractive micro-financing scheme is operational, considering the high upfront cost and overall cost, the SHSs are still beyond the affordability of majority of the low income rural households of Bangladesh.*** It is hence expected that some of the future systems will be scaled down to smaller sized SHS (e.g 10Wp to 20Wp) to cater to lower income households. Nationwide sales of small solar home system (SSHS) are currently underway, and the extension to the rural poor will be possible through the proposed recommendations involving the NGOs engaged in the locations.

The proposed scenarios are practical alternatives for extending solar electrification to the rural poor who are beyond the reach of existing SHS operations in the field. **Financing**


<sup>1</sup> *Market Assessment Survey of Solar PV Application in Bangladesh*, by Prokaushali Sangsad Limited for The World Bank, 1998.

<sup>2</sup> *Feasibility Study for a Solar Home Project within the Context of Alternative Options for Rural Electrification*, by Prokaushali Sangsad Limited for The World Bank, 2000.

<sup>3</sup> *Bangladesh Rural Electrification – Solar Home Program Preparation* by Prokaushali Sangsad Limited for The World Bank, 2001.

**portable solar lanterns** are viewed as one of the most promising approach for the rural poor. This type of lighting for the lowest socio-economic group can only be disseminated through the local NGOs, and GOB's national solar program (via IDCOL) may finance them parallel to the solar home systems.


The study recommends three scenarios to be adopted for serving the rural poor of Bangladesh with solar power:

 Scenario 1. Solar PV for household lighting of rural poor adapting IDCOL financial model

- LED and CFL based Small Solar home systems SSHS with solar panel of 10 to 20 Wp for the rural people from middle class to lower middle class family.

 Scenario 2. Portable solar PV solution for the poorest with micro-financing.

- Portable Solar Lanterns with LED and CFL
- Solar PV based Battery Charging stations in remote rural villages to charge batteries to run LED lanterns, lamps, mobile chargers etc.

 Scenario 3. Adaptable systems for commercial application of solar PV targeted toward the poor.

- Mini grid system for rural markets
- Micro-Utilities in rural markets

 Scenario 4. Empowerment of women

- Development of women entrepreneurship to become solar technicians and businessmen in their villages
- Development of network of “franchise” solar entrepreneurs

In summary, the proposed scenarios offer some measures that can contribute to objectives of RENDEV project in compliance to the National Energy Policy of Bangladesh (1996). In particular, this includes:

- *Environmentally sound and sustainable energy for continued economic growth, especially for the lower and middle income rural population.*
- *Energy needs of different socioeconomic groups, in particular to meet the need of the poor.*

## List of Abbreviations

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CBO	Community-Based Organization
CDM	Clean Development Mechanism, for carbon credit acquiring (United Nations)
Commission	European Commission
CEWDC	Coastal Electrification & Women's Development Cooperative
GoB	Government of Bangladesh
IDCOL	Infrastructure Development Company Limited
IPP	Independent Power Producer
LED	Light Emitting Diode
MCP	Microcredit programs
MFI	Microfinance institution
MRA	Microcredit Regulatory Authority
NGO	Non-Governmental Organization
PBS	Palli Biddut Samity (rural cooperative for electrification)
PGCB	Power Grid Company of Bangladesh Ltd
PSL	Prokaushali Sangsad Limited
PV	Photovoltaic
PO	Partner Organization
REN	Renewable Energy
REREDP	Rural Electrification and Renewable Energy Development Project
REB	Rural Electrification Board
RES	Renewable Energy Sources
RFM	Rural Financial Market
RMG	Ready-Made Garments
SHS	Solar Home System
SSHS	Small Solar Home Systems
WB	The World Bank

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# 1 Introduction

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## *The focus for RENDEV*

The RENDEV project aims to complement and strengthen the existing dynamics by focusing on those aspects which are not covered by the current design of the REREDP project, without interfering with the development of the solar market. In particular RENDEV will focus on:

- **How to reach poorer people;** currently SHS are used mostly by the middle and high income families, whereas the poor are still unable to afford it. Different solutions are thinkable, e.g. in the short term the initial investment can be decreased through the use of smaller SHS system and/or a higher grant. In addition, sale of solar system has to be linked with income generating activities. The experiences of the pilot project which is currently being funded by GTZ consisting of 24,500 small SHS might offer interesting ideas on this front;
- **Target Small and Medium sized Enterprises;** aiming to link electrification through PV more closely to income generation. Potential areas of focus include agriculture and food processing, and a range of services at local markets. The focus of the RENDEV activities should be to identify innovative and promising initiatives related to the above mentioned areas and next to support, strengthen and wherever possible multiply these initiatives.

Previous studies done under the RENDEV project have already allowed reviewing the strengths and weaknesses of Indonesian and Bangladeshi solar energy experiences, identifying the needs and markets for REN technologies, and assessing the potential role of microfinance institutions in both countries.

Building on the findings of these studies, this report seeks to provide recommendations on financial schemes that could effectively promote solar energy access in Indonesia, on the role of microfinance within these schemes, and on the different steps that should be taken to design and implement an adequate national solar energy program on the basis of the recommended financial models.

## 2 Context

**Main ideas:**

*Electrification situation*

Shortage of power supply, at times very acute and unreliable, has constrained economic growth. The lost output is, according to some estimates, as high as one percent of the GDP. This is critical because the foregone economic growth could have taken Bangladesh beyond the threshold of 6-7% of GDP growth rate that many policymakers think could make a significant and sustained dent on poverty. Around 80 to 90 million Bangladeshis still do not have access to electricity. 85% of them live in rural areas.

Renewable energy, and in particular solar energy, has a high potential in Bangladesh, and could be a solution to the electrification of rural, remote areas, especially for lighting and information.

*Microfinance situation*

Bangladesh is, in many ways, the most developed microfinance market in the South Asian region. Both India and Bangladesh count 16 of the 20 largest Microfinance Institutions (MFIs) of South Asian region.

Previous studies undertaken through the RENDEV project assessed current energy needs and the state of microfinance development in Bangladesh (*D3 – Overview of policies, Bangladesh; D8 – Needs assessment analysis and market feasibility for solar energy applications, Bangladesh; D14 – Identification of Microfinance Institutions, Bangladesh*). A brief summary of their findings is provided here as a reminder of the context of electrification and microfinance in the country.

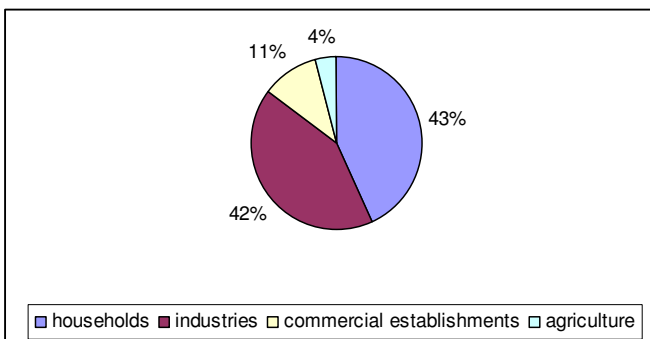
### 2.1 Electrification situation

#### 2.1.1 Electrification needs in Bangladesh

The total installed capacity for electricity production as of October 2009 was about 5,719 MW including Independent Power Producer (IPP) in utility service. The plants are predominantly thermal, and natural gas fired (natural gas is an indigenous fuel).

The **electrification rate** of the country is now **42%**, but the **rural areas** are not as developed as the urban areas seeing that their electrification rate is only **23 %** (against 79% or urban areas). The break-up of electricity consumption is shown on Figure 1.

**Figure 1 - Break-up of electricity consumption**



Bangladesh has a large unsatisfied demand for commercial energy with most of the supply limited to urban areas. The country's economy operates at low levels of commercial energy consumption, which is a crucial bottleneck to

economic development. The country has nevertheless had an **economic growth higher than 5%** for a few years, which led to an **increase of the electricity demand of 10% per year** (around 500 MW per year).

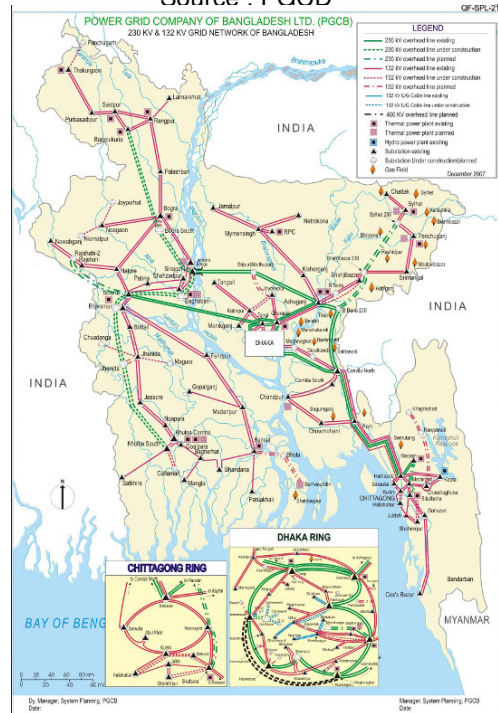
But against current demand of about 5,000 MW estimated, an average of about 1,000 MW has fallen short in capability out of 5,700 MW installed capacity due to old age. Additionally, about 1,300 MW has fallen short in availability out of 4,400 MW of capability due to lack of maintenance and shortage of gas supply.

Under these circumstances, the Government of Bangladesh (GoB) launched the REREDP to provide remote rural populations with electricity through grid extension and Solar Home Systems (SHS). But a large population is still not served by the NGOs under the national solar electrification program, and is beyond any grid electrification plan. The energy needs of this population (households, farmers, fishermen, micro entrepreneurs) are still unsatisfied.

### 2.1.2 Grid expansion and limits

Figure 3 is a scheme of the national electrical grid of the Bangladesh provided by the Power Grid Company of Bangladesh Ltd (PGCB). If the grid spreads on a relatively great part of the country, but still leaves many regions out of it. Furthermore, the grid is concentrated on the main cities of the country. Lines cross the countryside without serving the populations there.

**Figure 2 - Bangladeshi electrical grid**  
Source : PGCD



### 2.1.3 Renewable energy potential

Renewable energy contributes about 40 % of the primary energy consumption in the country, mainly through biomass, e.g. agricultural residues contribute almost half the national total, with cow dung, bagasse and fuel wood making up the rest. Those are providing poor quality cooking and lighting fuels.

Developing renewable energy access can address the electrification problem of rural and isolated areas. **The potential for some types of solar and biomass is very significant**, while others (**wind**, hydro, geothermal, ocean) will require technical and financial capacities not yet available in the country. The **potential for solar energy, in particular, is major**: the yearly average solar irradiation in the country is 4.5 kWh/m<sup>2</sup>.day.

Moreover renewable energy is best placed to provide access to energy **in remote and rural areas**. The continued and improved development of energy services for the poor can play a triggering role in tackling poverty by increasing economic activity in both agricultural and industrial areas, thus creating income generation opportunities and livelihood improvement.

As the potential is there, it is rather a matter of putting in place the right framework conditions at policy and regulatory level.

## 2.2 Microfinance situation

### Microfinance Institutions

Bangladesh is, in many ways, one of the **most developed microfinance market in the world**. India and Bangladesh together account for 16 of the 20 largest Microfinance Institutions (MFIs) of South Asian region.

The growth in the MF sector, in terms of the number of MFIs as well as total membership, was phenomenal during the 1990s and continues till today. Over the period of June 2003 to June 2006 the growth rate was over 70% in terms of horizontal expansion of microcredit borrowers.

Microcredit programs of NGOs (known as NGO-Microfinance Institutions or NGO-MFIs) and Grameen Bank play dominant role in this financial market. NGO-MFIs serve more than 61% and Grameen Bank alone serves 24% of the total borrowers. Among NGO-MFIs more than 80% of the outstanding loans are disbursed by the top 20 NGOs and three of them are very large and have coverage all over the country.

Service charge on credit varies from **10% to 20%** at flat method of collection. Average interest offered by NGO-MFIs on **savings** to the members is **5%**.

About **90% of the clients of this sector are female**. Average loan size of NGO-MFIs was found to be around **Taka 4,000**.

### Microcredit Regulatory Authority

The government, with the close cooperation of the Bangladesh Bank, established a regulatory framework: the Microcredit Regulatory Authority Act, 2006. The main responsibilities of the **Microcredit Regulatory Authority (MRA)** include issuance and cancellation of the license for microcredit, overseeing, supervising and facilitating the entire activities of MFIs. According to the Act, no MFI can carry out microcredit activities without obtaining licence from MRA.

4,236 NGO-MFIs have applied to MRA for licence by February 26, 2007. It was decided by the Authority that among these organizations, only those who can fulfil minimum criteria (**have equal to or more than 1000 borrowers, or equal to or more than Tk 4,000,000 loan outstanding**) will be considered for licence.

Up to 11 November 2009 the authority has issued 335 licences to different NGO-MFIs and licensing procedure of other selected NGO-MFIs are under process.

MRA is also working to prepare detailed rules and policies to monitor and supervise licensed NGO-MFIs that will cover governance issues, financial transparency, mode of operations and other related issues to ensure transparency and accountability in operation.

#### Next steps for Bangladesh:

Adapt the current financial model to be able to widen and deepen the outreach of Solar Home Systems

Sustain the Partner Organizations and go towards a social business model

### 3 Recommendations

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Rural electrification is still an acute problem in Indonesia: 80 to 90 million inhabitants, most of them living in rural areas, still lack access to electricity in the country. Renewable energy, and solar energy in particular, has been identified as a solution with a high potential for the electrification of remote rural areas.

Since 2002, the REREDP program has been a major success, beyond most optimistic expectations. As of September 2009, **384,887** SHS have been installed under the program while the target was set at 50,000 units.

The REREDP program combines effectively action of the Partner Organization (POs) on the field, monitoring and supervision and financement through the effective management of IDCOL and support – grants, concessional loans, technical support- of the donor community. the success of the program is such, that several donors (GTZ, KFW, ADB) have joined the program initiated by the World Bank and GEF.

Throughout the RENDEV project, various studies have been done to review the strengths and weaknesses REREDP solar energy experiences, to identify the needs and markets for REN technologies, and to assess the potential role of microfinance institutions in both countries. The lessons learned are summarized in table 1 below extracted from *D16 – Financial model*, a report that exposes extensively the recommendations of the RENDEV project.

To design an effective national solar energy program on the basis on these financial models, RENDEV further provides the following general recommendations:

- **The design of the subsidy policy** should be adapted in order to bridge the gap between the full cost of the solar technologies and the willingness and capacity to pay of the poorer. The actual characteristics of the subsidy policy :long term, universal, carefully designed should be conserved. Adjustments should be made in order to propose products affordable according to the varying willingness and capacity to pay of target populations according to areas' characteristics and equipment types.
- A **successful national solar energy program** is one that will be **stable** and operating in the **medium and long term** in order to effectively reach a significant population. In this aim, the sustainability of the financial model should be ensured at various levels: institutional, financial, technical, social and environmental. REREDP is a showing case of such charactestics.
- It is important to keep in mind that the role that **adequate financial services** can play in link with rural electrification **goes beyond financing the mere access to solar energy** technologies. Appropriate financial services can also be promoted to support the development of REN suppliers' activities in Indonesia and to help rural populations take advantage of the new business opportunities created by electrification.

#### 3.1 Strength of REREDP program and recommendations of Rendev

**Table 1: Strength of REREDP programs and recommendations of Rendev**

Strength of REREDP programs	Main causes	Recommendations
<p><b>National Coverage</b></p>	<p>National program under the management of a national institution IDCOL</p> <p>National outreach of the MFIs who ventured into the project</p> <p>A stable and operating in the medium and long term program</p>	<p>Maintain the national approach.</p> <p>Include any additional program into the actual framework of REREDP and particularly under the management of IDCOL.</p>
<p><b>Successful organisational setup</b></p> <p>IDCOL acts as a flexible coordinator and monitor</p>	<p>Clear framework and definition of the roles and responsibilities.</p> <p>Strict monitoring process and transparency, publication of the monthly updates on Idcol websites.</p>	<p>Avoid introduction of any disturbance in the current framework.</p>
<p><b>Grassroot program</b></p> <p>The Network of the POs is extensive and reach the target populations throughout the countries</p>	<p>Vibrant NGO community in Bangladesh and especially experience of MFIs in operating sustainable, business oriented programs.</p> <p>Large number of POs under the project</p>	<p>Continue and enrich the platform for discussion and generation of new ideas initiated by the RENDEV program.</p>
<p><b>Control of cost of operations</b></p> <p>The prices of the SHS installed in Bangladesh are the lowest in the world.</p>	<p>Density of population enables establishment of branches to serve a population large enough to break even</p> <p>Low cost of labour.</p> <p>Experience of Microfinance institutions in managing operations targeting the poor. (Base Of Pyramid)</p>	<p>Involve the POs in any extension of the program.</p>
<p><b>Provision of maintenance</b></p> <p>Maintenance is included in the contract and thus ensured to the client for the duration of the loan</p>	<p>Extensive network of the POs that allow them to reach effectively their clients</p> <p>Inclusion of budgets for the effective training of the field officers in the program to ensure that trainings are provided</p>	
<p><b>Ownership of the system</b></p> <p>The client own their system under a loan/lease agreement</p>	<p>Downpayment of 25% of the value of the system</p> <p>Clear contract that states the transfer of property</p> <p>Awareness raising campaign and role of the field officers in raising the awareness of the end-users on system capacities and limitations</p>	<p>Rules should be adapted in order to reach poorer populations</p>

**Table 2 - Strength of REREDP programs and recommendations of Rendev**

Limits of REREDP program	Main causes	Recommendations
<p><b>Limited outreach</b></p> <p>Behind the impressive numbers, the current scheme is providing a good solution to provide access to energy to the wealthier part of the unelectrified rural populations of Bangladesh only. The masses of rural workers are still left behind.</p>	<p>Cost of the system</p> <p>Capacity of the poor and very poor to commit to monthly payments</p>	<p>Test alternative solutions through the implementing capacity of the POs:</p> <ul style="list-style-type: none"> <li>▪ Small Solar Home Systems (10 to 20 Wp)</li> <li>▪ Portable solar solutions : solar lanterns</li> <li>▪ Adaptable system for commercial application of solar PV targeted toward the poor.</li> </ul>
<p><b>Ownership issue</b></p> <p>The ownership of the system if ensuring an optimal care of the system by the owner, prevents those who cannot afford it to benefit from modern energy.</p>	<p>Cost of the system</p> <p>Capacity of the poor and very poor to commit to monthly payments</p>	<ul style="list-style-type: none"> <li>▪ Test pay for fee solutions, the user pays for the usage only of the system. Ideally, he has the possibility to pay according to its income pattern, meaning on a daily, or weekly basis.</li> <li>▪ Share of ownership. The concept of micro-utility (one owner shares its system with its neighbours) should be extended throughout the network of Grameen Shakti and replicated by the other POs.</li> </ul>
<p><b>Limited competition</b></p> <p>Among the 18 POs under the program, Grameen Shakti ensures more than 60% of the new installation. Its close to monopoly situation can prevent innovation since all the players are following the leader. Rural Services Foundation, a new entrant, which started in 2008 has achieved to become the second among the POs in term of installations.</p>	<p>Charismatic personality and vision of Dipal Barua, former leader of the Grameen Shakti.</p> <p>Capacity of the Grameen Shakti to attract external support and thus launch innovation, capacity that other POs lack.</p> <p>Lack of interest of the other main NGOs/ MFIs for the program (Brac has installed a tenth of what Grameen did, ASA is not part of the program).</p>	<p>Promote competition by:</p> <ul style="list-style-type: none"> <li>▪ Convincing leaders of the majors MFIs of the potentiality – interest of the system</li> <li>▪ Channelling additional resources to the weakest NGOs. IDCOL has included that factor in the new loan agreements, providing smoother facilities to the smallest POs.</li> <li>▪ Encouraging newer initiatives and approaches such as the establishment of Green Energy Foundation by Dipal Barua.</li> </ul>

Limits of REREDP program	Main causes	Recommendations
<p><b>Limitation of power: SHS are not sufficient for productive uses.</b></p>	<p>Individual owners cannot afford to pay for systems of 1kW and more. (cost of 6,000 EUR).</p>	<p>RENDEV will recommend the <b>implementation of minigrids using the REN source available locally</b>, which can be biomass, water, wind, solar or a combination of several. In order to decrease the investment cost, and to increase the potential of the minigrid during the peak hours, RENDEV will promote the so-called hybrid systems, which combine one REN source and traditional diesel engine.</p> <p>Minigrids can be operated by mini-utilities and run as social businesses.</p>
<p><b>Aid dependency:</b></p> <p>Stakeholders pointed out that the provision of small scale energy systems is often hardly a profitable business for small and medium sized MFIs, as they lack the scale and necessary resources. The current growth of the solar system markets is possible thanks to financial support from international aid agencies, and because it is usually developed as a side activity within a larger company where it can, when necessary, rely on more profitable core businesses;</p>	<p>It would be very problematic for the POs to access alternative source of fundings and especially long term (6 years) loans as of now.</p> <p>Price for the end-users would have to be increased dramatically if support ends.</p> <p>If trainings were not granted, smaller POs would not have the means to train their staff, and larger might do less.</p>	<p>RENDEV considers that providing access to energy is an international priority and should be part of the Millenium Goals. Therefore, support from donors and aid agencies is legitimate and should be continued.</p> <ul style="list-style-type: none"> <li>▪ To ensure a sound allocation of the resources, programs and POs should be evaluated by independent auditors, and low performing one should quit the program. In that sense, annual objectives should be set between the POs and IDCOL to allow a fair evaluation between the POs.</li> <li>▪ Provision of the aid should be targeted more to the poorer section of the population.</li> <li>▪ Social business initiatives targeting the wealthier among the poor should be promoted.</li> </ul>
<p><b>Lack of involvement of the private sector</b></p> <p>In Bangladesh, like in many other countries, SME are weak and can not venture in new business. One of the reason being the lack of credit facility at the SME level</p> <p>The banking sector is reluctant to engage in financing rural electrification and REN projects for the following reasons:</p> <ul style="list-style-type: none"> <li>- Unreasonably high perceived risks toward these types of projects;</li> <li>- Limited access to equity financing.</li> </ul>	<p>Weaknesses of the SMEs</p> <p>Conservatism of the entrepreneurs who venture only in established businesses (textile)</p> <p>Credit risk</p> <p>National policies on lending</p>	<ul style="list-style-type: none"> <li>▪ Set up <b>guarantee funds</b> to reduce the perceived risks towards those types of projects. Such tools are already available in Indonesia.</li> <li>▪ Set up <b>credit lines</b> / provide soft loans to financial institutions to somewhat reduce the cost of lending in rural areas. Such credit lines can be sought in the donor community.</li> </ul>
<p><b>Success of the program</b></p> <p>The program is so successful that the major players have proven their capacity to transform it in a rising social business opportunity. Consequently, they have limited incentives to test different approaches and especially to venture in pay for fee model while they master the leasing model.</p>	<p>Area of comfort</p> <p>Managing a pay for fee program is very different that managing credits</p> <p>Higher risk of pay for fee programs</p>	<ul style="list-style-type: none"> <li>▪ Major POs should use their infrastructure to launch mini-utilities (minigrids) in villages where the population is dense enough.</li> <li>▪ POs should partner with their sister companies MFIs to develop entrepreneurial model to promote solar lanterns.</li> <li>▪ Allocation of the subsidies should promote those new initiatives.</li> </ul>

Building on the findings of all these studies, RENDEV recommends four different scenarios for serving the un-met energy demand of the poor.

In the light of the above findings on current Bangladeshi program, RENDEV recommends four different scenarios for serving the un-met energy demand of the poor:

✚ Scenario 1. Solar PV for household lighting of rural poor adapting IDCOL financial model

- LED and CFL based Small Solar home systems SSHS with solar panel of 10 to 20 Wp for the rural people from middle class to lower middle class family.

✚ Scenario 2. Portable solar PV solution for the poorest with micro-financing.

- Portable Solar Lanterns with LED and CFL
- Solar PV based Battery Charging stations in remote rural villages to charge batteries to run LED lanterns, lamps, mobile chargers etc.

✚ Scenario 3. Adaptable systems for commercial application of solar PV targeted toward the poor.

- Mini grid system for rural markets
- Micro-Utilities in rural markets
- Solar PV water pumping system
- Micro enterprise electrification

✚ Scenario 4. Socially motivated applications that are highly subsidized for the public.

- School Electrification
- Solar PV for Street Lighting
- Health Clinic and Hospital Electrification

Other applications include urban and rural application of solar PV in various use where off-grid power is necessary.

These models should first be tested at a small-scale (in a few branches of the POs) through a pilot program, before scaling up can be planned at the country level.

However, all those actions recommend the support of the whole global chain, working on the demand side as well as on the supply side.

**Main ideas:**

The Bangladesh solar community is achieving a fantastic shift in providing renewable energy to the rural people.

To reach the poor and achieve a new breakthrough in the life of Bangladeshi people, that community should build on its achievements and propose new options.

### ***3.2 Leveraging electrification benefits by supporting the development of income-generating opportunities in rural areas***

A REN program brings electricity to remote, rural areas. Beyond increasing standards of living, **electrification also create new opportunities for income-generating activities.**

Thanks to extended hours of business activities, electrification first enables microentrepreneurs to increase their existing activities (handicraft, night markets, night activities such as those linked to beauty care, etc.).

Second, electrification brings the opportunity to add value to existing agricultural productions, by enabling the use of upgraded technologies for transformation and conservation activities for instance (e.g. through the use of multifunctional platforms or cold generators).

And third, electrification can create opportunities for new businesses. In the particular case of Solar Home System, RENDEV has identified that the following activities could be developed: mobile phone charging station, community TV, TV and radio as marketing tools for restaurants, etc.

**Microfinance can have a strong role to play** in villages that gain access to solar electricity **by helping people take advantage of these new business opportunities.** Beyond the mere access to electricity, it is the whole local economy that can be fostered.

Furthermore, if people see that their current activities (agriculture, livestock, transformation and conservation, handicraft) can gain from access to electricity, they will be more likely to invest in REN technologies and they will pay greater attention to the good care and maintenance of their equipment. Demonstrating the clear economic benefits of electrification is thus important to ensure the success of a national solar energy program.

Opportunities should therefore be identified by the national program and promoted during awareness raising campaign and end-user training, in order to deepen the impact of the program on the rural economy by generating additional sources of income for the communities. **The development of microfinance services in remote, rural areas should be strongly promoted** in this perspective.

**Next steps for Bangladesh:**

Promote the establishment of minigrids.

Partner with the vibrant existing MFIs to offer dedicate loans for the investment in technologies and devices in order to help rural populations take advantage of the new business opportunities brought by electrification.

However, during its numerous discussions and awareness activities with the renewable energy community of Bangladesh, RENDEV has generated a limited interest for the option promoting mini-grid. Therefore, the 3 scenarios presented below represent in priority the choices of the Bangladeshi partner of the project.

## 4 Next steps for Bangladesh

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### 4.1 Scenario 1. Small Solar Home Systems

#### Technology : Solar Home Systems

- **A familiar technology**

Small Solar Home Systems ranging from 10 to 30 Wp are very much alike the SHS proposed by all the POs. Challenge in the technologies include a less reliability, because so small solar modules used to be produced by industrials only for demonstration purpose. However, during the last years IDCOL has been able to approve systems ranging from 12 to 24 Wp.

- **Prices**

These systems cost in the range of Taka 11,500 to Taka 13,000 (EUR 115 to EUR 130) including installation in the households to be compared to the price of a 50 Wp SHS : 30,000 Taka.

#### Target populations

- **Those who can afford to pay monthly Taka 400 (EUR 4) and more**

#### Strategy

- **Integration in the REREDP Program**

Small Solar Home Systems can be easily proposed as part of the range of products of the POs. The main challenge for the smaller organization would be to deal with a larger number of references and thus ensure a good management of the stocks.

#### Opportunity

- Propose a product at half the price of the classical SHS
- Installation and maintenance is just the same than SHS
- Financial product modalities should be the same as SHS
- **As a result SSSH is very easy to integrate in the offer of the PO**

#### Challenges

- The **products does not offer the same service than SHS** and especially are not big enough to power TV, and thus are less populars (in the areas where they were tested).
- **The target population is still very limited**, and without adaptation, the financial products can not meet the very limited capacity to pay of the rural poor.

#### Experiences

The IDCOL program for SSSH has begun since 2007 following the success of the national SHS program. Up to September 2009, a total of **17,898** small SHS has been installed under IDCOL SHS project, with a target of 24,500 before the end of the year. Most of the system users are from households **mid level** and lower income group or owners of small shops.

## 4.2 Scenario 2: Low Cost Portable Solar Lighting

### Technology : Solar Lanterns

- **A promising technology**

Solar lanterns are lamps which incorporate a battery and can be charged by a solar panel. Thanks to breakthrough in lighting technology with the LEDs, solar lanterns are becoming an alternative option to candles and storm lamps.

The power range of solar lantern start at 1W up to 8 W. A typical 1 W provide a lamp sufficient to read if placed very close to the book.



**Figure 3: Portable Solar LED Lantern**

Source : PSL

- **Prices**

Typical prices for the lanterns range between 25 and 50 EUR. System integrating solar panels start at prices around 35 Euros.

- **Limits**

The limits of the lanterns are caused by the batteries. Cheap, mass produced lead batteries does not last more than 6 months and will cost around 5 EUR for replacement. High performance Lithium Batteries can last more than 2 years, however their cost is such that rational economic choices lead to privilege lead batteries for the poors.

### Target populations

- **The poors**

### Strategy

- **1. Charging stations**

Individuals purchase the lantern with a loan and charge the lantern in a station strategically situated. Synergies with schools can be seek

- **2. Use the PO Networks and provide loans for the purchase of a complete solar lantern**

Loans can be provided by the branches for the solar lanterns

## Opportunity

- Instalment can be as low as 200 Taka for a duration of one year only
- The product responds to the lighting needs of the people according to a survey done by PSL among current users.
- Solar lanterns are portable and can be used at home as in business stalls.
- **Social marketing: through the school**  
The lamps respond to the needs of children and students, because they help them study at night. Empowered women can interact with the schools, lead awareness raising campaigns and sell the devices.
- **Empowerment of women**  
Women members of cooperatives or MFIs can be empowered to interact with the schools and sell the lanterns.

## Challenges

- Duration of the battery
- Lanterns are not part of IDCOL programs, because they do not comply with the guaranty requirements and will not be in a near future. Thus they have to compete in a disturbed market.
- Economic feasibility : the loan being lower, the share of operation cost raises, and actually, the price difference with a SSHS is small
- POs should review totally their marketing channels to be able to offer the products, which will be a major challenge for monoproducer, monoservice organizations.

## Experiences

The experiences in Bangladesh are documented in *D16- Financial report* and have been limited in their extent to pilot projects. The major lessons learnt have been:

- The buy in of the populations for individual lanterns rather than for charging station.
- The popularity of the concept since user trends to have several units.
- Solar lanterns should be a first step in electrification process since users are eager to acquire a Solar Home System if they can afford it.
- The need of a support of organized Pos
- The design of specific financial models (microloans).

## **4.3 Scenario 3. Micro-Utilities in Rural Markets**

### **4.3.1.1 Micro-Utilities in Rural Markets**

#### **Technology : Solar Home Systems**

- **A familiar technology**

Solar micro-grid use SHS. The SHS is wired to several lamps in the shops of the different users. In this case 3 to 4 small shop owners who are neighbors in a rural market, jointly use one SHS, as they are connected to a common SHS. Each shop uses a single lamp and collectively the monthly installment cost is paid by the shop owners, whereas one person remain legal owner of the system.

#### **Prices**

These systems cost in the range of 24,000 to 40,000 Taka.

This scheme of micro-utility is affordable to the shop owners since the true cost of the system is borne by more than one person, where the users pay fixed sum for the service they take from the system.

#### **Target populations**

- **Shop owners in rural markets (especially night markets)**

#### **Strategy**

- **Integration in the REREDP Program**

Micro-Utilities can be easily proposed as part of the range of products of the POs.

- **Private ownership**

One shop owns the system and sub-rent its use to its neighbours at a price set by the PO.

#### **Opportunity**

- Micro-utilities cost less than 400 Taka per month to the owner of the shop
- The light attracts more customer and the additional turnover generated more than offset the cost of the system
- Similar systems should be developed for households

#### **Challenges**

- If the system is replicated to households, the capacity to pay of the users will be questioned since they will not be backed by an income generating activity.

#### **Experiences**

Grameen Shakti is successfully implementing microuilities since 2007.

#### 4.4 Scenario 4. Empowerment of women

In disseminating the technologies to the villages, microentrepreneurs and especially women can be empowered to install, repair, maintain and even sell Solar Home Systems.

##### Technology : Solar Home Systems, SSHS and lanterns

- **Technology are simple**, women can be trained in 6 months to do all the operations required for their repair and maintenance.

##### Target populations

- **Population of the villages**

##### Strategy

- **Use the multiplier effect of microentrepreneurs to reach a larger population.** More families will be visited, more systems sold so that the operational costs of the POs can be significantly lowered.
- **Franchise contracts should be signed between the entrepreneurs and the POs.** Entrepreneurs will market systems for the POs. The POs' officer will check the capacity to pay of the client and provide him the loan. The entrepreneur will then be in charge of installing and maintaining the system for a defined fee.

##### Opportunity

- Expand the outreach of the POs
- Provide business opportunities to women in the rural areas
- Use word of mouth among women as a marketing strategy
- Decrease cost of operations of the POs. One officer will generate more revenues through its network of entrepreneurs.
- Synergies with mobile banking technologies (monthly payment through mobile phone) can allow the field officers to not have to visit their clients every month. Similar systems should be developed for households.
- Increase the quality of service since entrepreneurs will be living very close to their clients and thus able to be very reactive.

##### Challenges

- Training entrepreneurs is an investment and will thus require the necessary infrastructure and most likely adequate fundings.
- The capacity of the PO to organize networks of entrepreneurs.

##### Experiences

- **The large network of Grameen Technology Centres (GTC)** engage a large number of women in technical capacity and entrepreneurship among rural women is encouraged.
- However, so far those women were envisaged for the maintenance of the system, not for its marketing.