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## TERMINAL EVALUATION

of the

### *Renewable Energy-based Rural Electrification Programme for Botswana*

*[PIMS 1771, ATLAS 00039468]*

## Final Report

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**PROJECT TITLE:** Renewable Energy-Based Rural Electrification Project

**COUNTRY:** Botswana

**GEF AGENCY:** UNDP

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**UNDP PROJECT ID:** BWA10-00039468

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**GEF FOCAL AREA:** Climate Change

**GEF OPERATIONAL PROGRAMME:** OP #6: Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs

**GEF STRATEGIC PRIORITY:** CC 4: Off-Grid Renewable Energy for Productive Use

**EXECUTING AGENCY AND PROJECT PARTNERS:** Botswana Power Corporation

**EVALUATION TEAM MEMBERS:** Yogesh Vyas

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## Acronyms and Abbreviations

BOTEC	Botswana Technology Centre
BPC	Botswana Power Corporation
BRET	Botswana Renewable Energy Technology
CP	UNDP Country Programme for Botswana (2003-2007)
EAD	Energy Affairs Division
GHG	Greenhouse Gas
GEF	Global Environment Facility
GEF-SGP	Global Environment Facility – Small Grants Programme
JICA	Japanese International Cooperation Agency
LPG	Liquefied Petroleum Gas
MFDP	Ministry of Finance and Development Planning
MMEWR	Ministry of Minerals, Energy and Water Resources
MOU	Memorandum of Understanding
MPS	JICA Master Plan Study on Photovoltaic Rural Electrification
NDP	National Development Plan
NGO	Nongovernmental Organizations
NPV-REP	National PV Rural Electrification Program
PDF B	Project Development Facility Block B
PIMS	Project Information Management System
PSC	Project Steering Committee
PV	Photovoltaic
RERE	Renewable Energy-based Rural Electrification Project
SADC	Southern African Development Community
SHS	Solar Home System
UNDP	United Nations Development Programme
UNDAF	United Nations Development Assistance Framework

## Acknowledgement

The evaluation consultant acknowledges all interviewees for the time they availed and sharing their views, experience and insights. He conveys special thanks to the members of the Project Coordination Group, the Project Steering Committee, BPC project staff, BPC Lesedi staff, and UNDP-Botswana, for the logistical arrangement and mission itinerary. I hope this report will help the RERE project contribute to further development and scaling up of PV solar industry and other renewable energy technology in Botswana.

## Executive Summary

### a) Brief Description of the project evaluated

The RERE project aims at supporting national efforts to reduce Botswana's energy-related CO<sub>2</sub> emissions by promoting renewable energy and low GHG technologies as a substitute for fossil fuels (fuel wood, paraffin, charcoal) used in rural areas. The activities proposed in the project are designed to contribute to the removal of barriers to the wide-scale utilization of renewable and low GHG technologies to meet the basic electricity needs of individual households in terms of lighting, power for radio/cassette players, TV and income-generating activities. In turn, this project will contribute to the initiation of the intended renewable energy program of the Government of Botswana (GOB) and the development of the private sector in the provision of renewable energy in the country. The project objectives are:

### b) Purpose and objectives of the evaluation

The purpose of this evaluation is to provide the project partners i.e. GEF, UNDP and the Government of Botswana with an independent assessment of the impacts and key achievements of the RERE project as compared to the project document for the five years implementation of the project. Assess the expected outcomes and their sustainability and identify and discuss the lessons learned, through measurements of the changes in the set indicators, summarize the experiences gained and recommend for future policy dialogues and changes to the implementation structure.

### c) Key aspects of the evaluation approach and methods

*To achieve the above objectives the terminal evaluation is to address the following:*

- Assess the impacts and key achievements of the project vis á vis its objectives and outcomes as per project design indicators.
- Assess the relevance of the project objectives to the national development agenda and priorities, UNDP thematic areas and needs of beneficiaries.
- Review the appropriateness and clarity of roles and responsibilities of stakeholders and their level of satisfaction with the project achievements.
- Assess the achievements of the project in terms of timeliness, quality, quantity and cost effectiveness of the expected outcomes
- Assess the prospects of the sustainability of the project outcomes and benefits in the longer future.

#### *Methodology of the evaluation*

The Terminal Evaluation (TE) was carried out as per the UNDP/GEF Monitoring and Evaluation Policies and Guidelines<sup>1</sup>. The project achievements and progress were assessed against five key criteria, namely: **Relevance** – The extent to which the project is suited to local and national development priorities and organizational policies, including changes over time; **Effectiveness** – The extent to which an objective has been achieved or how likely it is to be achieved; **Efficiency** – The extent to which results have been delivered with the least costly resources possible; **Results** – The positive and negative, and foreseen and unforeseen, changes to and effects produced by a development intervention. The scope of TE also covers the

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<sup>1</sup> Guidelines for GEF Agencies in Conducting Terminal Evaluations, Evaluation Document No. 3 (Global Environment Facility, Evaluation Office, 2008); and The GEF Monitoring and Evaluation Policy, Evaluation Document No. 1 (Global Environment Facility, Evaluation Office, 2006) – both documents accessed at <http://thegef.org>

effectiveness of the program's **Implementation Approach; Stakeholder Participation; and Monitoring and Evaluation.**

The terminal evaluation was conducted through a combination of processes including a review of the key project documentation, interviews with project stakeholders and site visits. It included visits to UNDP Country Office, Project Executing Offices of Government, - EAD, BPC as well as selected national partners and stakeholders, including interviews with key individuals both within the project sites, the government staff, , private sector (PV dealers), and project beneficiaries mainly communities in various districts. **Annex 2 of this report contains the Evaluation Matrix detailing the key issues raised in the evaluation.**

#### **d) Principal Findings, Conclusions, Recommendations and Lessons Learned**

This section reports the main findings of the evaluation and followed by conclusion, recommendation and lessons learned.

##### **(i) Principle Findings**

###### **Relevance of program**

There is a consensus among the stakeholders that RERE project is still highly relevant in the context of: (1) rising fuel prices; (2) high cost of grid-connectivity in rural areas; (3) need to decrease the dependence on imported electricity and fossil fuels; and (4) to reduce the country's emissions of GHG, including a reduction in use of non-renewable biomass.

Project is based on an integrated approach to address solar energy barriers (policies, financial engineering, hardware demonstration, awareness, and public-private partnership). The project has been integrated into the Government's National Development Plans 9 and 10 and has attracted both Government of Botswana (GOB) and other partner donors such as Sweden for the mini-grid PV and Japan for the 1 MW PV projects.

###### **Effectiveness and efficiency of programme**

###### ***Programme design, conceptualization and formulation***

The project objectives and components as stated in the GEF project document (2005) were clear and achievable in the five years (2006-2010) allocated to the project. The assumptions and risks articulated in the document were also appropriate and are still relevant. However, there were two changes in the design of the project at its inception.

The project through a participatory workshop discussed and revised the logical framework matrix in 2008. However, its use in reporting and monitoring project's outcomes/outputs has been erratic.

###### **Implementation**

The project has spent only about 48% of the allocated GEF budget primarily on policy support and delivery of technology packages. Much of the budget earmarked for awareness building, public – private capacity building and training, M&E, etc., remain unutilized. Over the past year the UNDP CO have and also previously in the exception report in 2008, without much success made a number of efforts to make project stakeholders aware of the seriousness of the situation and the need to address the major shortcomings of the project. Likewise only 41% of the Government (co-financing) budget has been used for the project. Much of the budget earmarked for the same components mentioned above and also for the replication and sustainability component remains unutilized.



The level of commitment from the Executing Agency (EAD) and the Implementing Agency (BPC), to the project has thus far been less than desirable as exemplified by part time staff. The UNDP CO has conveyed this shortcoming to the highest levels (i.e. ministerial level). The evaluator learned that over the past several years the focus of BPC has been on grid-extension and off grid PV connections have had a low profile within BPC, which partially explains why the project has been afforded so little attention within BPC. The evaluation indicates that BPC staff do not have the capacity to properly manage the project given other competing responsibilities. The agreed staffing structure for the project was not put in place and counterpart staff were not assigned and dedicated to the project as was pleaded during the Project Inception Workshop in 2007. The Inception Workshop itself was delayed by some 8 months relative to the signing of the project document.

**Stakeholder** participation during the project formulation and implementation is vital to obtain a broad buy-in into the project. It was noticed that several line ministries and other governmental agencies, representatives of private sector, non-governmental and community based organizations, and academic institutions, indicated in the original project document particularly women's groups have not been participating in the project. They seem to have been well consulted during the development of the GEF Project Document in 2005 but not during the project formulation and implementation. BPC indicated that they have been invited but may lack funds for transport to come to the meetings.

**Monitoring & Evaluation** has also been weak. The project has not made effective use of the log frame matrix that was improved first in a participatory workshop held in 2008 and then in early 2010 led by a Danish consulting firm based on the "Smart" approach. The project is awaiting the purchase of a web-based software for Impacts Assessment and Monitoring, whose procurement has been delayed significantly. Review of the various reports generated by the project indicates that the M&E was more process driven and based on the agenda items discussed in the PSC, Project Coordination Group Meetings etc. than tracking the outputs and outcomes on a regular basis. The minutes of the meetings show that tracking on activities has been on an ad-hoc basis.

The failure to follow-through planned M&E actions and the Mid-Term Evaluation (which was not carried out) which might have changed the direction of the project, is largely attributed to UNDP's lack of supervision and oversight of the project, as admitted by its senior management.

## **Results and Impacts**

Global and development objectives were not met and could not be assessed because key activities required to quantify their attainment including the establishment of baseline database on agreed indicators at the project design stage was not carried out.

**Outcome 1:** As of end of May 2011, there is a huge gap between the results to date for Outcome 1 (less than 18% on installation of Solar Home Systems and less than 5% in the sales of rechargeable lanterns and efficient cooking stoves) compared to the original targets regarding the number of consumers using PV-based lighting and cooking systems and solar home systems installed and operating at the end of the project.

The installation of the mini-grid PV system comprising a sterling engine and biogas unit has also been delayed significantly; the pre-feasibility was completed just recently by a Swedish firm with the system design underway to be followed by tendering. The mini-grid PV is not expected to become operational until 2012.

**Outcome 2:** Progress on Outcome 2 related to finalization of the Energy Sector policy has also not been achieved fully. The policy remains at the draft stage since November 2010, awaiting recruitment of a second consultant by EAD to update the policy to be submitted to the Parliament for its approval by July 2011 for budgetary allocation. The meeting with the management representatives of the MMEWR indicated that the policy would be in place by July 2010. The policy has adequate inspirational language on renewable energy.

Gender mainstreaming plan also took a long time for the project to complete and has yet to be implemented. The RE activities are now integrated into National Development Planning (NDP 10) frameworks.

The PV standards supposedly developed by the Botswana Bureau of Standards (BOBs) are not visible or in use by PV vendors and certainly no enforcement mechanism exists. Two PV vendors are concerned that inferior quality hardware may find its way into the country and installation being done by electricians not truly certified for installing PV appliances may do a poor job. One franchisee admitted that he had seen roof mounted panel on the wrong side of a house and not with the required tilt of the panel for optimum angle with respect to the direction of sun's rays. Incorrect sequencing of the equipment during installation can also damage some sensitive components. This is why the adoption of local standards and technical training is so vital.

**Outcome 3** related to awareness building and perception changing has seen some positive results through a series of mass media, trade fares, briefings to the councilors in 2007/2008 but not much recent activities as indicated by documents in the DropBox®. This may have been due to lack of coordination between EAD, BPC and BPC Lesedi staff who have similar responsibility related to consumer awareness though for different layers of public (i.e., from consumer to local government to senior government officials). A clear communication strategy articulating both short and long-term actions including the roles and responsibilities of EAD, BPC and BPC Lesedi needs to be developed. Impact of the training should also have been measured to make future training more relevant. Deliberately modest marketing and advertising by BPC Lesedi to keep pace with low level staffing and current investment, according to one interviewee is leading to very marginal demand of the products.

**Outcome 4** related to public-private sector strengthening also needs to be strengthened. Some private sector PV technicians and franchisees have been trained in PV technology, some franchisees have or about to take further training and also training in business development skills. However, a more systematic training plan needs to be developed to complement the skills required for BPC Lesedi's field installation and maintenance, and to create an adequate pool of service and repair technicians. The PV technicians should be certified by an appropriate governmental agency. It was learned that the majority of the PV technicians used are electrical engineers who have had hands on training on the job for installing PV equipment. A reputable PV vendor expressed his fear that some of these installations may be below the industry standards. As no national standards are in place or being enforced, replication of current programs may show high rate of future system failures. Regarding the training, BPC Lesedi Senior Management indicated that the performance has not been very satisfactory and this is exasperated by the project office. Training requests are turned down by the BPC office even before they reach the UNDP. Delays have also been experienced in arranging payment of travel allowances for the training providers. It appears that there is lack of coordination and appreciation for the training requirements.

**Outcome 5** related to financing is also developing slowly. Franchising packages have been completed and two out of 4 identified franchisees have signed the agreement. Negotiations are still ongoing with Bank Gaborone on extending credit facility to potential franchisees and customers from the revolving funds to be set up by BPC Lesedi. Lack of capital may make it difficult for the franchisee to scale up their programs. GOB injected 7 Million Pula into the BPC Lesedi cash flow which took a long time for it to be approved. Similar delays for the next expected injection of 10 million Pula may cause BPC Lesedi to experience cash flow problems forcing them to take greater debt by borrowing from a commercial bank. Until BPC Lesedi's sales through franchisees reach a volume of several thousands, its revenue may not be sufficient for it to stand on its own feet as is expected of it as a private entity. A meeting with the management of the MMEWR indicated that a position paper under review stipulates diverting 0.5 Thebe out of 5 Thebe levy being collected for the National Energy Fund would be used for end-user subsidy and future injections into BPC Lesedi. But this process given the backlog is not likely to be replenished for the next 10 years.

**Outcome 6:** Most of the activities under Outcome 6 related to replication and sustainability have yet to be initiated.

### **Sustainability**

The following four components were assessed to arrive at the overall rating of Moderately Unlikely. Section 3 of the report presents the rating scale.

#### **ii) Conclusion**

The attractiveness of solar PV for rural energy provision has increased substantially over the past several years in developing countries and the project remains the best practical leverage the UNDP CO has to engage with the GOB on renewable energy issues. The evaluation consultant is of the opinion that UNDP CO appears to be in support of granting of an extension to the project to allow for the remaining funds to be utilized and to keep positive relationships with government stakeholders. As indicated by UNDP representative, the project represents UNDP's only avenue for promoting low GHG at minimal costs to government (i.e. consumer driven) and for promoting a true energy service that addresses the needs of both men and women at a household level.

While BPC-Lesedi seems well-positioned to reap the benefits of much of the policy and awareness-building activities that the project has helped support since its inception, there nonetheless remain a number of important challenges they will need to overcome to successfully meet their financial targets.

It is clear that the implementation set-up for the project with no dedicated staff and a part-time Project Manager has been a failure and that it has taken almost five years of poor implementation for stakeholders to finally acknowledge this fact and push for changes. The issue of the implementation structure should have been dealt with 3 years ago and despite repeated attempts by the UNDP CO as exemplified in the 2008 Exception Report and later in the PIRs to get this issue resolved.

The evaluation consultant in his meetings with the key government and project stakeholders received a highly enthusiastic expression of their overall commitment to the project and desire to see the project extended. However there was general consensus that the current modality under which the project was being managed had not worked and any extension was predicated on the development of a new operational and management structure. An internal UNDP memo indicates that a number of structural changes to the current implementation arrangement were supposed to be discussed and proposed with projects stakeholders, and all of which were to be tabled for discussion at the PSC meeting scheduled last year. The evaluation consultant did not find any progress on this front.

#### ***Project Rating***

The project was given a **Marginally Unsatisfactory** rating for progress towards the **Development Objective** and **Unsatisfactory** rating in the 2010 PIR for **Implementation** by the UNDP Regional Technical Adviser (RTA) for the project. The UNDP CO Project Manager gave **Marginally Unsatisfactory** rating to both components in the 2010 PIR. The evaluation consultant gives a rating of **Unsatisfactory** to both components (see table below).

#### **iii) Recommendations**

##### **General**

Based on the key findings from the evaluation, it appears that, with a 2 year extension and a reconstituted project structure and dedicated staffing, revised work plan integrating BPC-Lesedi detailed action plan, the project can make up for a great deal of lost time and show positive results. However these actions should be

carried out or initiated within the next two to three months time. More specific recommendations by institutions are given below:

#### **For the Project Implementing Unit**

- Discuss and agree on a new project structure and roles and responsibilities of the individuals. A project organogram should be developed. This should reflect BPC Lesedis' action plan and interaction between EAD, BPC, BPC Lesedi and UNDP. Appropriate staffing particularly the Project Manager should be dedicated on a full time basis.
- The Stakeholders plan in the original Project Document should be reviewed and the engagement with the thus far less active governmental agencies, private sector, non-governmental and community based organizations including women's groups should be strengthened. The Stakeholders should also be actively involved in promoting the project particularly awareness raising and perception changing about negative sentiments on solar PV.
- The GEF National Focal Point who has not been involved so far should also be invited to participate in the project. The possible extension should be predicated upon the active 'political' support of the GEF Focal Point. This will assist in addressing any GEF complaints regarding the extension.
- Review the current Log Frame Matrix and revise it to suit the new structure made up of EAD, BPC and BPC Lesedi. This should not be delayed until appropriate software is purchased.
- The awareness and perception changing by the project needs to be strengthened. A systematic strategy and a plan on awareness building aimed at the different layers of the public (consumers, local government and central government) needs to be developed. The Communications Strategy under development by EAD should be expedited and should define the role and responsibilities of the various project stakeholders. It should be based on broad consultations among the key stakeholders.
- The Gender Action Plan developed by Energia should be integrated into the project work plans.
- BPC Lesedi in collaboration with EAD and BPC should carry out a consumer survey to assess the current needs and satisfaction on the use of PV technology thus far and document lessons learned.
- A baseline database should be established for the key indicators to be tracked in the M&E.
- Project should develop a Strategy on Replication and Sustainability (Component 6) including a strategy to ensure the ongoing and future flows of financial resources into the project once the GEF assistance ends.

#### **For BPC Lesedi**

- Expedite negotiations with Bank Gaborone on credit schemes for the end-users and franchisees.
- Establish better coordination and flow of information with the Executing and Implementing Agencies keeping in line with the private sector nature of BPC Lesedi. Initiate and maintain a consumer needs and satisfaction survey database.
- Conduct training in a coordinated manner with governmental and national institutions.
- Expand the delivery of solar PV systems to institutions such as hospital clinics, schools and others for income generation. This may include provision of solar water pumps, solar crop dryers, etc.
- Exercise greater diligence in selecting franchisees to balance between "who will potentially make a good franchisee" versus "who will be a better business man/woman". Their training needs should be assessed and addressed.

#### **For the Government of Botswana**

- Renew and increase its commitment to the project and participate actively in the PSC meetings
- Create a level playing field for renewable energy by removing fiscal and market barriers – removal of custom duty & VAT The impact of removal of VAT would need to be analysed and quantified. Furthermore, the removal of VAT has to be directed at specific components, should such an approach be warranted.

- Expedite the development of the Energy Sector Policy and initiate the development of a Renewable Energy Strategy
- Expedite the development of the end-user subsidy model and subsidy to be directed at BPC Lesedi capital expenditure
- Take the necessary and immediate measures to ensure that standards on PV are approved and enforced through consumer awareness and inspection and control at ports and entry borders.
- Implement the PV code of practice to ensure good systems functionality. An appropriate body should be given the role in the certification of PV installers and informing the public through awareness campaigns and the media.

**For UNDP**

- Consider approving BPC's December 2010 request for a project extension by two years subject to the project accepting the above recommendations
- Agree on an arrangement with GOB to revise the work plan and associated budget to grant a two-year extension to the Project.
- Reconfirm GOB's earlier financial commitments to the project as well to BPC Lesedi
- Play a more active role in its oversight role of the project and provide support to the portfolio manager by assigning an experienced JPO or other means

**iv) *Lessons Learned***

- The main lesson learned from this project is that a strong commitment by the government, Executing and Implementing Agencies is very vital for the success of the project.
- Rural policies and planning related to renewable energy can have major influence on the project outcomes and sustainability and must be explicitly addressed in project design and implementation.
- Institutional arrangement for project implementation can greatly influence the value of the project in terms of demonstrating viable business models and thus achieving sustainability.
- While there is a high demand for solar PV in Botswana for solar home systems, there is also a high potential for PV use for productive and income generating uses which needs to be explored further.
- Establishing a reasonable equipment standards and certification procedure for solar home systems can ensure quality service while maintaining affordability.
- The Logical Framework Matrix forms the basis for sequencing of program activities, and for M&E. Project Management staff should make full use of this tool, and when needed staff should be trained in its use. Lack of adequate M&E leads not only to sub-optimal achievement of project outcomes, but also fails to provide the necessary feedback for the project to be responsive to changes in its environment.

# 1. Introduction

## 1.1 Purpose of the evaluation

As stated in the Terms of Reference (**Annex 1**), the purpose of this terminal evaluation (TE) is to provide the project partners i.e. GEF, UNDP and the Government of Botswana with an independent assessment of the impacts and key achievements of the Renewable Energy-based Rural Electrification (RERE) project as compared to the project document and subsequent project design changes in the past five years implementation of the project. More specifically, the TE assesses the expected outcomes and their sustainability, summarize the experiences gained and the lessons learned, and recommends future actions and policy dialogues, and changes to the project implementation structure for the project to get back on its track.

The TE of the RERE project has been commissioned by the Government of Botswana's (GOB's) Ministry of Minerals, Energy and Water Resources (MMEWR), Botswana Power Corporation (BPC), United Nations Development Programme (UNDP) Botswana and the Global Environment Facility (GEF) in accordance with the project's M&E Plan. The results of the TE evaluation will inform the project partners on the need for any extension of the project duration and whether the project has a chance to deliver the agreed outputs, how sustainable those outputs would be, and what changes need to be considered in the design and implementation of the project. The evaluation will also inform the stakeholders on the achievements of the RERE project in promoting renewable energy and reducing carbon-related emissions in Botswana. And in turn, the RERE project will also inform the activities outlined in the United Nations Development assistance Framework (UNDAF) and the United Nations Operational Program Operational Plan (UN-POP).

The TE was carried out from May 15 to June 15, 2011. The inception report was presented on May 23, 2011, and the draft TE report and a power point presentation were presented on June 10 to the joint committee comprised of Energy Affairs Department (EAD), BPC, BPC-Lesedi, SIAB and UNDP.

## 1.2 Key issues to be addressed

The Evaluation Matrix (**Annex 2**) summarizes the key issues and questions raised in the TE. They follow the five key evaluation criteria prescribed by GEF in its Monitoring and Evaluation Policy, namely the Relevance, Effectiveness, Efficiency, Results and Sustainability of the programme.

The TE included the following:

- (i) Assess the impacts and key achievements of the project vis á vis its objectives and outcomes as per project design indicators included in the Log Frame Matrix.
- (ii) Assess the relevance of the project objectives to the national development agenda and priorities, UNDP thematic areas and the needs of the beneficiaries.
- (iii) Review the appropriateness and clarity of roles and responsibilities of stakeholders and their level of satisfaction with the project achievements.

- (iv) Assess the achievements of the project in terms of timeliness, quality, quantity and cost effectiveness of the expected outcomes
- (v) Assess the prospects of the sustainability of the project outcomes and benefits in the longer future.

### 1.3 Methodology of the evaluation

In addition to the approach described in the previous section, the evaluation included ratings on two broad aspects of the program, namely (1) achievement of objectives and outcomes; while also rating the effectiveness of the program (2) stakeholder participation (3) monitoring and evaluation, and (4) sustainability.

The terminal evaluation was conducted through a combination of processes including a review of the key project documentation, interviews with project stakeholders and site visit. It included visits to UNDP Country Office, EAD, BPC, BPC Lesedi as well as selected national partners and stakeholders, including interviews with key individuals both within the project sites, the government staff, NGOs, private sector (PV dealers), and project beneficiaries mainly communities in various districts.

In order to provide empirical evidence for quantifiable assessment, this TE has made use of the following complementary instruments:

#### *Documentation review*

The documents listed in **Annex 3** were reviewed particularly those mentioned in the Monitoring and Evaluation Plan of the Project Document, such as the minutes of the Project Steering Committee meetings, Project Working Group Coordination meetings, Quarterly Progress Reports, Quarterly Financial Reports, Annual Project Implementation Reviews (PIRs), Audit Reports and related documentation. Most of these documents were sourced from the electronic project database in the Dropbox maintained by UNDP Country Office. Other documents listed in the Annex were provided to the evaluation consultant during individual interviews. Annex 3 also lists documents on experiences and lessons published on other similar projects in Africa.

#### *Questionnaire*

To complement the documentation review, the questionnaire given in **Annex 4** was used to gather information on performance of the project against the 5 key evaluation criteria described earlier. The questionnaire also contains specific questions related to the conceptualization and design, implementation and performance of the RERE project. The questionnaire was sent to the UNDP Project Manager ahead of the field mission, and reflects the clarifications provided during the first orientation meeting with the UNDP Project Manager on May 17<sup>th</sup>.

#### *Interviews and consultations*

Face-to-face interviews were carried out with selected stakeholders during a four-week in country mission. **Annex 5** provides a list of persons and institutions that were consulted.

The interviewees were identified following the documentation review and in consultation with UNDP Project Manager, BPC Project Manager and other members of the Project Working Group. In general, the

interviewees included the following of stakeholders: Government and ministries; UNDP-GEF staff who have the project responsibilities, Staff of the Executing Agency (EAD), BPC Project Coordination staff, Members of the BPC Lesedi Project Board, Project stakeholders, particularly members of the various project level steering committees and project beneficiaries in the field; institutions involved in capacity building, parastatal bodies; private sector and individuals entrepreneurs; and financial institutions.

### ***Field visits***

Since the main objective of the RERE project is to enhance the livelihood of off-grid and rural communities that are sparsely distributed in Botswana, it was important to understand the social acceptability of solar PV technology and their impacts on beneficiary/end-user communities, as well as understanding their experiences with its use.

The 2 sets of locations were identified for the field visits taking into consideration the distances involved, the need to involve the franchisees and maintaining impartiality and transparency in selection and invitation of project beneficiaries to the meetings with the consultant.

- Kweneng West within 45 minutes drive from Gaborone: The Franchise Region consists of all the 4 villages that were used during the pilot phase (Gope, Dikgatlong, Medie and Lentsweletau) For the purpose of the evaluation, it was agreed that Lentsweletau and Media be visited. The two villages represent distinctly different socio-economic and infrastructure profiles and would therefore collectively provide a full spectrum of issues. It was noted that there are other franchisees covering the Southern District but the distances were prohibitive.
- The second franchise region identified was Ramotswa within 45 minutes drive from Gaborone.

BPC Lesedi Gaborone Regional Office Manager organized the meetings through the resident franchisees and translation where needed, especially with the project beneficiaries in rural areas.

**Annex 6** gives a list of questions administered to the Franchisees and individual households and a summary of their responses. In selecting beneficiary communities, attempt was made to identify both successful cases, as well as cases where deployment of solar systems may have failed or where problems were encountered during technology deployment, if any.

## **1.4 Structure of the evaluation**

The terminal evaluation relies on the information obtained from various sources involved in the project development, management and implementation. As to this, the evaluation process was structured to:

- Review document obtained from those sources (UNDP/BPC, BPC Lesedi,EAD).
- Conduct consultation meetings and interviews with project stakeholders and get their views and obtain more information.
- Field visits for physical inspection of some installations and conduct discussions with end users.
- Compile the information revision results and personal observations.
- Compare project achievements to what was stipulated in the Project document on objective-by-objective basis.
- Draw conclusions and recommendations.



The Terminal Evaluation report is comprised of four 4 sections. Section 1 gives an overview of the RERE project, including its development context by situating the problem statement. Section 2 provides an introduction to the need to undertake this Terminal Evaluation, as well as the methodology used to carry out the evaluation has been presented. Section 3 gives the findings of the evaluation. Section 4 summarizes the conclusions, recommendations and the lessons learned.

## 2. Project Description and development context

### 2.1 Project Background

The RERE project aims at supporting national efforts to reduce Botswana's energy-related CO<sub>2</sub> emissions by promoting renewable energy and low GHG technologies as a substitute for fossil fuels (fuel wood, paraffin, charcoal) used in rural areas. The activities proposed in the project are designed to contribute to the removal of barriers to the wide-scale utilization of renewable and low GHG technologies to meet the basic electricity needs of individual households in terms of lighting, power for radio/cassette players, TV and income-generating activities. In turn, this project is expected contribute to the initiation of intended renewable energy program of the Government of Botswana (GOB) and the development of private sector in the provision of renewable energy in the country.

The renewable energy situation assessed at the implementation of the PDF-B stage confirms that solar energy is available in abundant quantity, more or less equally distributed over the country throughout the year. Other renewable energy sources such as wind are limited, location specific and unevenly distributed during the year. Biomass is currently the main renewable energy source of energy used in Botswana for cooking and heating. However, available biomass resources (woody biomass and agricultural residues) are insufficient to generate and distribute electricity on a sustainable basis. As a result, the main source of renewable energy to be utilized in Botswana will be solar energy in terms of various PV-based technologies such as mobile solar system, solar home system, battery charging stations and mini-grids.

The Energy Master Plan (EMP, 2003) proposes access to electricity through connection to the national grid, off-grid connection via PV for those households where it makes economic and social sense, and improving the affordability of electricity to households. It also identified the following factors:

- Electrification planning should be integrated with other development planning; and
- Rural electrification should be regarded as part of the national electrification program, albeit with different objectives and requirements to those for urban electrification.

Furthermore, the EMP states that PV electrification should be part of the national electrification planning. Planning of PV electrification needs to take cognizance of grid extension plans and should be funded under the same principals as the rural grid electrification. While rural electrification has been an important component of the national development agenda, the high cost of rural grid electrification program have been a barrier, with the result that at the time of the approval of the Project Document in 2005, only 17% of the rural population had access to grid electricity services, compared to 36% in the urban areas. As of 2011, 51% of the rural population has access to grid electricity services, compared to 75% in the urban areas.

There have been several previous/ongoing studies conducted on PV application in the country. These include JICA Master Plan Study on Photovoltaic Rural Electrification (MPS). The MPS was designed to formulate a master plan to promote rural electrification based on PV system over a period of 10 years starting 2003. The outcomes of the MSP were largely used in preparation of the UNDP-GEF RERE project.

The objectives of the MSP were to:

- Supply solar electricity, quickly and under affordable conditions to households in rural areas that cannot benefit from grid electrification and other energy supply services;
- Implement the PV rural electrification project in a least cost basis and financially feasible and sustainable manner;
- Integrate with infrastructure planned for specific regions; and
- Expand environmentally friendly energy use.

Other prior initiatives on renewable-energy based rural electrification are<sup>2</sup>:

- Botswana Renewable Energy Technology Project;
- Manyana PV Project;
- National PV Rural Electrification Program;
- Motshegaletau Centralized PV System;
- GEF Small Grants Solar Lantern Program.

## 2.2 Project start and duration

The RERE project commenced with the CEO endorsement in 2005 and Project Document signature in October 2005 to run for five years with a planned completion date of December 31<sup>st</sup>, 2010, under the execution of the Energy Affairs Department in the Ministry of Minerals, Energy and Water Affairs (MMEWR). An agreement was signed between BPC and EAD in October 2006 to facilitate implementation of the project. **Table 1** summarizes the Project Budget – both for the GEF and government co-financing. While the overall budget remained the same during the design and implementation phase, as noted earlier, the end-users portion of the cash co-funding indicated in the table below was cancelled as the subsidy model was changed to fee-for-service model.

**Table 1: Project Budget**

Component description:	Estimated Budget (USD)		
	GEF, cash	Cash co-funding	In-kind co-funding
Component 1: Implementing hardware	600,000	2,369,057 (Govt.) 1,197,145 (end-users)	90,000
Component 2: Policy/Institutional	250,000	96,640	50,000
Component 3: Awareness raising	500,000	399,600	100,000
Component 4: Training	550,000	497,946	100,000
Component 5: Financial engineering	600,000	79,860	50,000
Component 6: Learning and replication	395,000	96,660	105,000
Monitoring and evaluation	105,000	96,700	
<b>TOTAL</b>	<b>3,000,000</b>	<b>(Govt: 3,636,463) 4,833,608</b>	<b>495,000</b>

## 2.3 Problems that the project seeks to address

The project seeks to promote the use of PV in Botswana through the removal of barriers. At present, 24% of all villages (approximately 112) and 100% of all localities (381) with more than 200 people are not connected to the grid. In terms of households, 49% of all rural households are not yet connected to the grid.

<sup>2</sup> Annex 9 presents brief description of these previous renewable energy programs in Botswana that provided experience and lessons for the RERE project.

Botswana has excellent solar conditions, with an average of 320 (GEF Project Document, 2005) clear, sunny days per year and an average global irradiation of 21 MJ m<sup>2</sup>/day throughout the country. Therefore, introducing individual PV systems would make it possible, in the long term, for an estimated 25-35% of the 140,000 to 160,000 rural households to have their basic electricity needs met from the locally available solar resource. This will have the effect of reducing the number of liters of paraffin used for this purpose by 100-115 million over the 20-year life of the equipment. This will lead to global benefits by reducing GHG emissions. Thus, it is expected that the introduction of PV systems for the provision of electricity services in Botswana will generate a reduction of approximately 345,000 tonnes of CO<sub>2</sub> over a 20-year period, based on an average reduction of 108 million liters of paraffin. Please refer to the incremental cost analysis and matrix in Section II, Part I of the GEF Project Document (2005) for more details.

## 2.4 Project Barriers

The following barriers to the utilisation of renewable and low GHG technologies in rural areas in Botswana were identified during the preparation phase of the full-scale project in 2005:

- *Information and perception:* Lack of knowledge about available technologies and technological developments; financial institutions being insufficiently aware of the financing needs / possibilities associated with the renewable energy sector; consumers not aware of the technologies that are available or have a wrong perception about what that technology can / cannot do, or how it is to be used / maintained;
- *Financing:* Donor-funded projects creating unrealistic price expectations amongst consumers; private sector companies in the renewable energy sector having difficulties raising sufficient credit to finance their operations; payments required from customers being either too high or too inflexible, resulting in a very small uptake and extremely slow market growth for PV systems;
- *Technology:* The balance between component quality and price is delicate and when components are too expensive, users may choose not to use them; poor people are being asked to ‘experiment’ with technologies, that is something that they cannot afford to do; even the smallest interventions by customers (e.g., checking battery water levels) can be problematic;
- *Legal and policy:* The existing legal / policy structure is not particularly conducive to the growth of the renewable energy sector; and
- *Institutional/organisational:* Donor-funded projects are often implemented by public sector institutions rather than by the private sector; renewable energy is not yet considered an integral part of the country’s rural electrification efforts; a weak link exists between the public and private sectors in respect of renewables.

The research on barriers has identified a number of premises or preconditions that an ideal delivery model for rural electricity based on renewable energy must adhere to, namely:

- It meets the demand of the rural customer as much as possible. As the rural customer is not one homogeneous group with the same demands and equal financial means, the ideal delivery model must be flexible enough in its technology and financing mix to suit the needs of the different market segments;
- It forms an integral part of an existing rural grid electrification programme. This means that the ultimate responsibility for the delivery model should rest with the same institution/authority responsible for rural grid electrification and that a project format for the implementation of the model is avoided;
- It promotes accessibility of information, actively create awareness and allows quick incorporation of new technologies (flexibility);

- It promotes close cooperation and collaboration between the public and private sectors and allows for ongoing human resources development (training) and development of a commercially viable renewable energy sector;
- It provides affordable off-grid electricity and renewable energy to customers in an efficient and effective manner;
- Incorporates methods for reducing theft of solar equipment; and
- It includes national standards and codes of practice for renewable energy systems to ensure consumer protection.

This project was designed to remove barriers to the introduction of renewable energy-based systems (notably PV) to meet the basic energy needs of rural communities in the targeted villages. It has adopted a market transformation approach to the PV market and is consistent with the terms of GEF Operational Programme 6. To the extent that it helps stimulate greater sales of PV to households and institutions, it was intended to also help reduce both the incidence of respiratory and eye problems attributable to paraffin soot and the risk of hut fires. The proposed project activities would not have taken place in the absence of UNDP and GEF support, making the project activities largely incremental.

Removal of the identified barriers to the use of renewables / PV is also intended to provide the private sector with the necessary incentive to improve their services and extend / set up new businesses for the sale of renewables/PV systems. This was expected to benefit rural customers in Botswana in that they will have access to environmentally clean electricity services without the long wait for the arrival of grid-connected electricity, or they will have access to alternative energy services in places where the grid is already connected. The net result was expected to be four-fold:

- Provide rural consumers with a better quality of life;
- Create opportunities for income-generating activities based on the availability of electricity services, thus assisting in poverty eradication;
- Have potential to substantially reduce the rural energy sector carbon emissions; and
- Eliminate safety hazards associated with candle and paraffin fires, while simultaneously providing better indoor air quality (decrease the number of smoke and soot-related health problems associated with prolonged exposure to paraffin fumes).

### 3. Findings

There has been unanimity among all stakeholders who were consulted during this evaluation that RERE was highly relevant given a context and baseline of: (1) rising fuel prices; (2) high cost of grid-connectivity in rural areas; (3) decreasing the dependence on imported electricity and fossil fuels; (4) to reduce the country's emissions of GHG, including a reduction in use of non-renewable biomass;

#### 3.1 Project Formulation

Project rationale, objectives, outputs and activities presented in the GEF Project Document (2005) are discussed below. The project objectives and components were clear, practicable and are judged to be feasible within the five year time frame planned for the project.

The planned outcomes in the project formulation (2005) were not "**Smart**" as it was not a requirement then:

- 
- S** Specific: Outcomes must use change language, describing a specific future condition
  - M** Measurable: Results, whether quantitative or qualitative, must have measurable indicators, making it possible to assess whether they were achieved or not
  - A** Achievable: Results must be within the capacity of the partners to achieve
  - R** Relevant: Results must make a contribution to selected priorities of the national development framework
  - T** Time- bound: Results are never open-ended. There should be an expected date of accomplishment
- 

#### Analysis of the Log Frame Matrix (LFA)

**Global objective:** To reduce Botswana's energy related CO<sub>2</sub> emissions by substituting fossil fuels (petrol / diesel, wood fuel, paraffin and coal) with PV and LPG, to provide basic energy services to rural homes and community users.

**Development Objective:** To improve people's livelihoods by improving their access to and affordability of modern energy services and to assist the Government of Botswana with the initiation of a renewable energy program for the rural areas, thus reducing the dependency on imported fossil fuel.

These objectives were to be achieved by project activities designed to remove barriers to the wide-scale utilization of PV for providing energy services. The project was to consider the institutional, financial and market instruments necessary to demonstrate the viability of using the private sector to participate in the process of sustainable development in rural areas through the delivery of basic energy services using PV.

The project consists of six components. Each of these components is made up of an immediate objective, specific output(s) and a number of activities. By achieving the immediate objectives, the project is expected to contribute towards the achievement of the global and development objectives:

1. **Delivery of technology packages:** *To implement three different delivery models targeting different end-user groups and making use of different PV and PV -based technology packages.*
2. **Policy support and policy framework:** *To assist with the development of policy and institutional arrangements conducive for the integration and provision of off-grid electricity services within the existing rural grid electrification program.*

3. **Awareness raising and changing of perceptions:** *To increase awareness and change perceptions among the general public, decision-makers and rural consumers on the potential role of PV and LPG in meeting basic energy needs.*
4. **Private and public sector strengthening and training:** *To strengthen and support the public and private sector working in the PV and renewable energy sector to provide better quality of service.*
5. **Financial engineering:** *To assist with the development of appropriate financing mechanisms for the larger scale dissemination of PV-based technologies to rural customers.*
6. **Learning and replication:** *To disseminate experience and lessons learned to promote rapid implementation of rural electrification based on renewable and low GHG technologies throughout the country.*

Project activities are focused on introducing different PV-based technology packages in 88 targeted villages; to review and make recommendations for improving the policy environment for renewables, notably PV; launching awareness campaigns for both decision-makers and end-users; strengthening the capacities of the public and private sectors to deal with the design and implementation of PV programs; assisting PV companies in business planning and training of technicians; testing end-user and supply-chain financing mechanisms; and putting in place the necessary conditions for replication of the activities implemented under the 5-year UNDP/GEF supported initiative.

### **Key indicators**

Key indicators include the number of PV systems sold over the lifetime of the project, combined with the reduced consumption of paraffin for customers switching to PV-based systems. Another important indicator is the price of PV systems and the number of dealers involved in the PV market. The project's monitoring and evaluation system was to make provision for gathering baseline data and track these indicators at regular intervals.

Important project assumptions relate to the market price of paraffin, the willingness of the private sector and end-users to engage in the project activities and willingness at the political level to provide subsidies for renewable energy-based rural electrification. Assumptions were to be monitored and the project intervention strategy adapted accordingly.

The above strategy, indicators, outcomes and outputs contained in the LFA in the GEF Project Document (GEF 2005) and presented in the previous section are still valid to-date except with some minor modifications. For example, the Global Objective included the reduction in the use of paraffin as a primary lighting fuel and related indicator of 80% reduction in the use of paraffin by the completion of the project. However, at the outset of the project, this objective was eliminated as it was deemed that LPG industry did not need any barrier removal and was thriving well in the private sector. This objective was then substituted with the objective to promote the use of efficient cooking stoves which would help save the use of woody biomass and hence reduce the emission of green house gases.

Further refinement in the form of more detailed indicators came about as a result of the RERE Project hosting a Monitoring and Evaluation Stakeholder Workshop on 19<sup>th</sup> May 2008 in Gaborone. The Workshop resulted in updating the LFM of the program and reviewed the impact monitoring needs and objectives of stakeholders in order to guide the impact monitoring process. Proposed revised Outcome and Impact specific Indicators, Hypotheses and Means of Verification were identified to ensure that appropriate methods of verification are appropriate to provide the information required by the project. It was agreed that the revised

outcomes, impacts, indicators, hypotheses and means of verification would be applied to the existing LFM of the RERE Project and would be transposed to the casual chain of the impact monitoring framework. Most frequently identified Outcomes among the six components of the Project included - cleaner air/less pollution and increased productive activities/increased business investment. Most frequently identified Impacts included – Improved health, improved education, increased household/rural income and increased use of renewable energy technologies. However the evaluation consultant did not find any evidence of the revised LFM having been instituted. Review of the progress reports generated at the initial stage of the project showed a random use of the LFM in monitoring and evaluation. Furthermore due to lack of a proper baseline study and any ongoing effort, it has not been possible for the project to monitor the impact such as the savings in energy cost due to switching from paraffin to solar electric power, reduction in respiratory or eye diseases, and promotion of income generating activities to fight poverty.

Subsequently, the 2008 LFM was again reformulated using the Smart approach for the use of the BPC Lesedi (Franchisor) as part of the Impacts Assessment and Monitoring (February 2010) consultancy to a joint venture by Danish and a local energy consulting firm. Again, the evaluation consultant did not find any evidence indicating its use in the M&E by BPC Lesedi which was also confirmed in the interviews with the BPC Lesedi staff. It was noted by the evaluation consultant that as part of the Outcome 6 on Learning and Application, a web-based Impacts Monitoring System is to be purchased to allow the project to follow the consultant designed system. An appropriate source in South Africa has been found, however, in interviews with UNDP Project Manager and Assistant Resident Representative, it was learned that the purchase would only be approved if the project was granted an extension.

It is therefore recommended that the project team reconvene, agree on the final form and format of the LFM and start its implementation while awaiting the establishment of a web-based system. And related baseline data should be collected and as soon as possible.

### **Assumptions and Risks**

In implementing the proposed initiative a number of assumptions and risks were identified during the design stage and are judged to be logical and robust, and have helped to determine activities and planned outputs.

A first level of risk relates to the rural consumers who might not approach the rural sales outlets for either PV Lanterns and mobile systems or SHS technology packages as a result of a) lack of awareness and b) lack of sufficient funding to purchase what are very expensive technological solutions for most rural customers. This risk was expected to be mitigated through a number of activities to increase the awareness with rural customers (components 1, 3 and 6), design appropriate funding mechanisms tailored to the needs and abilities of rural customers (component 2) and through Government subsidies, that decrease from 80% the first year, to 60% in the fifth year of the project period.

A second level of risk relates to the fact that there will be a permanent need for subsidies for rural electrification in Botswana, whether based on grid extension, isolated mini-grids or stand alone household systems. The allocated funding from the Central Government under the National Development Plan (NDP) 9 was committed and there was no institutionalized financial mechanism reaching beyond the project period of five years. However, in the early stage of the project design, a fee-for use model was adopted in lieu of end-user subsidy. There is still a clear risk that without any subsidy, renewable energy-based rural electrification expansion may not occur after the project period. This risk had been addressed within the project through



activities that focus on awareness raising with key decision-makers (components 1, 3 and 6), policy support to include renewable energy-based electrification as a least cost option for rural electrification into national policy and plans (component 2) and by creating an implementation infrastructure for cost-effective and efficient delivery of renewable energy-based electrification to rural customers throughout Botswana (components 4, 5 and 6). Discussions with EAD Project Manager indicated that a position paper outlining the subsidy to the end-users has been developed and submitted to the Permanent Secretary for his processing. The position paper stipulates that a levy of 0.5 Thebe out of the levy being collected for the existing rural electrification fund would be made available in form of subsidy to the end users so that their monthly user fee would be reduced from 70 Pula to 45 Pula. The exact time line of this approval process is not clear.

A third level of risk relates to the continued participation of the private sector who are considered to be the prime movers for implementation of the proposed initiative and to continue renewable energy-based rural electrification long after the project period has come to an end. Their active involvement could be lacking as a result of a) not having in place a skilled and informed labor force for design, implementation and maintenance services or b) not having sufficient incentives in place to justify involvement and investment by this sector. These risks have been mitigated by activities that relate to training and private sector strengthening (component 4), the provision of subsidies on hardware from Government, combined with setting up appropriate financing mechanisms for rural consumers (component 5), and by giving the private sector the lead role in implementing the proposed activities. Furthermore, the principle of Government creating the enabling environment for private sector implementation that has been adhered to in the proposed initiative – in combination with the above components - sends a clear message to the private sector that a long-term sustainable market for renewable energy-based rural electrification is being considered seriously. The learning and replication activities included under component 6 add confidence to the existence of a longer-term market.

The fourth level of risk relates to the replication of the proposed activities throughout rural Botswana. A combination of activities that have put in place the conditions for replication, such as policy support (component 2), increasing awareness (component 3), training related activities (component 4), increasing access to (rural) finance (component 5) and close monitoring of lessons learned (component 6), provide a solid basis for replication. However, this is going to be largely based on successful implementation of the here proposed activities in combination with continued Government support (mainly financial support through subsidies) after the 5-year GEF support has come to an end.

The fifth and final level of risk relates to the very high HIV/AIDS infection rates in Botswana, reaching approximately 30% of the rural adult population. This is not a risk unique to this project, but one that can be found in each and every activity being implemented in Botswana. Although the Government of Botswana is expending substantial time and effort to tackle this problem on a national basis, very few effective risk mitigation activities can be made available under the proposed initiative other than programming additional financial resources for training and capacity strengthening. This is necessary as more people will need to be trained to ensure sufficient available and qualified personnel for the longer term. It should also be mentioned that early deaths from HIV/AIDS will result in loss of income for already poor rural households that will have an immediate effect on those households' ability to purchase consumer goods, including PV systems. No effective risk mitigation activity under the proposed initiative is capable of dealing with this national macro-economic phenomenon other than the possibility to increase the already substantial Government subsidies.

## **Lessons from other relevant projects (e.g., same focal area) incorporated into project implementation**

Other prior initiatives on renewable-energy based rural electrification include:

- Botswana Renewable Energy Technology Project;
- Manyana PV Project;
- National PV Rural Electrification Program;
- Motshegaletau Centralized PV System;
- GEF Small Grants Solar Lantern Program.
- JICA Solar PV pilot project

JICA Solar PV pilot is the most recent solar PV program. All other mentioned above are fairly old, some having started in the 19770's are presented in **Annex 9**.

Following and parallel with some of the above initiatives, GEF approved in year 2000 a PDF B Project for 'Identifying and Overcoming the Barriers to Widespread Adoption Renewable Energy-based Rural Electrification in Botswana'. The main objective of that project – which led to the formulation of the present project brief –was “the development of a coherent action plan for establishment of a sustainable infrastructure for providing energy services to off-grid communities, using low-GHG emission energy technologies”. As such, the project looked into:

- Available renewable and low GHG energy resources.
- Suitable technologies to harness these resources.
- The characteristics of rural customers.
- Barriers to renewable energy use in rural electrification.
- The establishment of suitable financing mechanisms for suppliers and end users.
- The reduction / mitigation of risk to BPC, among others, when designing and implementing delivery models (e.g., the expansion of BPC's role to include the widespread use of decentralized clean energy options for off-grid energy supply and services).
- Infrastructure and capabilities needed to ensure sustainability of the project activities long after the initial GEF seed funds are exhausted.

This preparatory phase was conducted with a view towards presenting this full-size project brief for GEF funding.

The 2003 JICA Master Plan Study (MPS) was to be used as the basis for developing a business plan for PV rural electrification. The MPS analyzed various problems that were encountered in different PV projects around the country, and on the basis of the lessons learned, made recommendations for a new institutional framework to promote PV rural electrification and an operation and management methodology, among other issues. The MPS also established criteria for the selection of villages to be covered by the PV electrification project in order to ensure that selection is made on the basis of the minimum cost principle. Key planning parameters, such as the target electrification rate and PV systems sizes, were established by taking into account the results of a pilot dissemination project conducted in three villages and by checking the effectiveness of the program recommended in the MPS. A preliminary business plan for PV rural electrification was formulated to incorporate all necessary elements and its feasibility was evaluated through a financial and economic analysis. Finally, necessary government support was identified to allow the project to be operated on a sustainable basis. A PV pilot dissemination project was set up in three villages

(Lorolwana, Kudumatse and Motlhabaneng), based on a fee-for-service principle with Solar Home Systems (SHS) and a Battery Charging System in Lorolwana.

The JICA PV solar pilot project is therefore the most recent PV solar project in Botswana. This pilot project was launched in 2003 at Kudumatse, Motlhabaneng and Lorolwana villages. Unlike the previous PV pilot projects, the JICA pilot project employed the fee-for-service model. With the fee-for-service model, an energy-service company provides electricity for a monthly fee to rural households. However, the PV system was owned and maintained by the energy-service company. In the context of the JICA pilot project, BPC was given the mandate to provide PV generation electricity and maintain PV systems in three villages mentioned above. Like all PV projects, the major objective of JICA PV solar pilot project was to assess viability and sustainability of solar energy technology as an alternative source of energy supply for rural-based communities in Botswana. The JICA pilot project was aimed at paving a way for a multi-million BPW solar-based rural electrification project which is in the pipeline. The multi-million BPW solar-based rural electrification project was aimed at stimulating and achieving commercialization of solar PV systems for rural households (solar home systems). The review of the JICA PV solar pilot project highlighted a number of important issues associated with solar home systems and centralized battery charging system.

***Key conclusion and recommendation from the JICA program:***

- i. The fee-for-service model looks affordable to large sections of the rural population, and hence might have better potential for developing large market for rural solar PV applications. The research data showed that the affordability level of SHS in the country's rural communities stands at 63.2%.
- ii. The level of technical problems encountered by participants in all the three villages is 37.7%. This is among the major barriers to rapid development of PV systems in Botswana. For future PV projects, it is vital that technical support is strengthened before the project is launched.
- iii. 72.5% of the participants claimed that a number of issues are still unresolved regarding JICA PV solar project. This is because of delay between project termination and handing over the running of the project to the communities or individual house owner. It is recommended that for future project such delay should be avoided.
- iv. Out of 70 participants 76.3% believed that the PV solar project has improved their life styles, by increasing factors, such as, convenience and safety in their houses, improved indoor air quality, and improved higher quality of light for school children. Based on all these social dimensions, it is recommended that the use of PV systems should also be extended to low income groups in urban and semi-urban locations.
- v. There is a serious lack of information among rural communities regarding the difference between PV power generation and grid electricity. Out of 174 respondents 60.8% alleged that they do not know the difference between PV power generation and grid electricity. This can be viewed as an obstacle to the development of PV system in Botswana. For future PV projects, it is important to strengthen information campaign for the end user to make informed decision.
- vi. The majority of local residents who participated in the centralized battery charging system believed that the major problem with the system was the weight of the PV solar battery. Considering the geographical spread of majority of the rural communities in Botswana, it is recommended that the weight of PV solar batteries should be reduced.

The RERE project therefore owes its genesis to the JICA MSP study and the pilot program. JICA pilot program based on a fee-for-use business model was the first such application in the Botswana and its success provided an impetus for a similar approach for the RERE project in lieu of the 80% subsidy to the end user stipulated in the original project document. Furthermore noting the service delivery problems in the remote area, the RERE project came up with the franchising approach.

### **Stakeholder participation**

The main stakeholders participating in RERE project during the design phase were : (i) government ministries and institutions; (ii) parastatals; (iii) capacity building organizations; (iv) financial and private sector institutions, (v) end-users/beneficiaries.

The development of this project proposal was undertaken in a participatory fashion, consulting the major stakeholders throughout the process. This process began with a detailed socio-economic study of representative rural consumers; both those who have used renewable energy products and those who have not. In addition, consultation was undertaken with a wide range of groups and organizations who are stakeholders in this process, including representatives from the supply chain (end users, dealers, importers and international suppliers), community based organizations, consultants and training institutions. Consultation was undertaken during the three stakeholder workshops held in March, June and September 2003 in Gaborone. Numerous meetings were also held over a nine-month period with key stakeholders on an individual basis.

Specifically, stakeholder consultation was undertaken with: EAD, MMEWR, UNDP, BPC, Ministry of Finance and Development Planning, Department of Meteorological Services, representatives from local / district authorities involved with rural development, the University of Botswana, Department of Vocational Education and Training, Madirelo Training and Testing Centre, Renewable Energy Innovation Center (RIIC), Botswana Botswana Technology Center (BOTEC), the financing sector, Botswana Bureau of Standards, Japan International Cooperation Agency (JICA), private sector companies involved in providing renewable energy, the National Aids Coordinating Agency and other health-based NGOs, the Citizen Empowerment Development Agency (CEDA), Botswana Community Based Organisations Network and other rural consumer representatives and the Botswana Congress of NGOs. In addition, consultation with representatives from similar UNDP/GEF projects, including the on-going project in Lesotho, was undertaken.

Stakeholder participation during the development of the Project Document was adequate. However, as discussed later under the section on Implementation, several of these agencies did not participate actively during the implementation phase.

### **Replication approach**

Component 6 of the project was designed to replicate models, approaches and lessons learned, both within the 88 targeted villages and the rest of Botswana. After a successful demonstration during the project pilot period, the private sector-led model for the delivery of basic electricity services to rural communities, it is expected that the franchisees in the planned six region of the country are expected to expand their business to other regions in the country (some are already operating country-wide), thus replicating delivery and financing modalities. This replication would depend on the early performance and success of the franchising model, strong awareness and perception changing campaigns, mass media advertisement, demonstration at consumer level, and solid servicing and maintenance. It would also depend on the provision of sustainable and long-term subsidies to the end-users by the Government of Botswana.

### **Cost-effectiveness**

Because this project did not request financial assistance from the GEF for a subsidy per Watt peak power (Wp) of the PV equipment installed, incremental costs associated with this project are considered to be the costs of the activities designed to remove the barriers to PV electrification and to stimulate the PV market in rural Botswana. For this reason, the project was expected to focus on putting conditions in place for long-term Government subsidies, stimulating cash sales and designing rural savings, credit and leasing mechanisms by the private sector in combination with non-finance related conditions required to expand the market further (i.e., awareness, policy framework, training and institutional strengthening).

Furthermore, the co-financing ratio was 1:1.63 which means that for every GEF dollar spent, 1.63 dollars was to be spent by the Government of Botswana and the customers towards the global and development goals of this project. A cash contribution of USD 3,636,463 was committed to this project by the Ministry of Finance of the Government of Botswana.

As presented in the GEF Project Document (2005), GEF funds were all for soft components while the cost of the solar systems hardware was to be funded by the GOB. The incremental cost analysis in the project document is consistent with this strategy. This project aims to integrate the use of renewables for rural electrification into Botswana's national development programming, including allocation of long-term (institutionalized) financial assistance for such programs. The Government had planned to allocate subsidies of between 60-80% towards the cost of providing basic electricity services to approximately 6,500 rural customers as part of the proposed project. This project also encourages the development of a strong private sector involvement in PV activities by making appropriate financing mechanisms for dealers and suppliers and consumers available, as well as training and activities to improve product and service quality (e.g. codes and standards, including enforcement). Following the approval of the project document by the GEF and at the early stage of the project design, the subsidy model was dropped in lieu of the fee-for service model. The GOB co-financing as reflected in the revised project budget remained at the same level.

### **UNDP comparative advantage**

There are several factors that accord UNDP a clear comparative advantage as a GEF implementing partner in RERE project. These are:

- The longstanding in-country presence of UNDP has meant that it has developed effective partnerships with all the key stakeholders relevant to the project. These partnerships spanning from policy-decision makers to communities have ensured that UNDP has a very good understanding of the needs and expectations of the various stakeholders;
- The UNDP CO has a dedicated and well informed Energy and Environment Officers, staffed by nationals. This makes it easy for UNDP to communicate with GOB and in particular the EAD on issues related to Energy Policy, and with BPC and BPC Lesedi on the RERE project;
- UNDP's Country Program Document (which outlines the interventions of UNDP in GOB over a typical period of 3 years) is formulated following discussions with GOB, and hence is linked to the government's priorities; and
- The clear comparative advantage of UNDP also stems from the fact that RERE Project emanated from GEF Project Information Note (Pif), where UNDP CO was the GEF implementing partner.

The evaluation consultant learned that at various times the support from UNDP to the RERE project suffered from lack of staff (e.g. after departure of the UNDP JPO), and change over in the position of Deputy

Resident Representative during the project implementation. Otherwise, all the current and former BPC project staff indicated that the quality of UNDP support has been good.

### **Linkages between project and other interventions within the sector**

In interviews with the EAD project staff the evaluation consultant learned about the following initiatives being undertaken by EAD:

- EAD was undertaking a pre-feasibility study on a 200 MW Concentrated Solar Power (CSP). This would be followed by a full feasibility study to be funded by the World Bank. The CSP project would come in the heels of a similar 100 MW CSP project under implementation by Eskom and funded by the World Bank and the African Development Bank and co-financed with the concessionary loan from the Clean Technology Fund administered by the two banks. The Botswana CSP project would help the country reduce its dependency on energy generation from coal which is in abundant supply in the country. The CSP generated power would obviously grid-fed so would benefit the industries and consumers connected to the grid. A paper on feed-in-tariff is under review to promote the participation of Independent Power Producers (IPPs).
- EAD is also engaged in a feasibility study with the Government of Japan to design a 1 MW solar PV project to be piloted at Sekhlotane, in the outskirts of Gaborone. [The designs is for the low voltage reticulation to distribute electricity to the users in Sekhlotane village.](#) Another initiative by EAD in collaboration with the Japanese includes research and development ideal indigenous *Jatropha* plants suited to the semi-arid climate of the country to produce biodiesel. The biodiesel production would also use animal fat from the slaughter houses run by the Botswana Meat Commission. The combined contribution from *Jatropha* and animal fat is estimated to be 10% of the 2020 energy demand.
- Some low level effort is also underway to develop indigenous biogas plants and also to design capture of landfill methane gas and apply for carbon credits.
- EAD, BPC and BPC Lesedi are also collaborating with the National Capacity building institutions such as the Local Enterprise Authority (LEA) to offer business development training to solar PV franchisees, with the DVEP and MTTC to offer technical courses on PV technology including testing and installation for the PV technicians. And BPC is planning to support the ongoing activities of the Solar Industry Association of Botswana (SIAB) to stimulate the solar PV market and help set a forum for information exchange, setting of PV standards, etc.

Overall, the GOB is taking the right approach in exploiting various opportunities to mitigate the climate change impacts as articulated in its first communication to the UNFCCC. The RERE project would benefit from the complementarity with above programs.

### **Project Management Arrangement**

A Project Steering Committee (PSC) chaired by the Permanent Secretary of the MMEWR guides the Project to ensure harmony with national policy and strategy as well as develop partnerships with the private and public sectors. The Department of Energy Affairs is the lead Executing Agency with Botswana Power Corporation as the Implementing Agency with collaboration with other stakeholders from within the RE sector and UNDP. For the day-to-day operation of the programme, one full-time Chief Technical Advisor (CTA) was made available, fully funded through GEF. CTA was supervised by the Chair of the PSC being

the Director of the EAD whilst continuing to be based at BPC and working with the BPC team according to the agreed work plans. The private sector also was to have a key role in the implementation of the programme, and are seen as the 'driver' of the project. To ensure active participation from the private sector, the project issued consultancy contracts to employ existing private sector participants to carry out awareness training, demonstration projects, work on financing packages, etc.

UNDP-Botswana was to provide support services upon request from the executing agency in accordance with the regulations, rules and procedures of UNDP. The nature and scope of support services is described in Section IV of the GEF Project Document: Letter of Agreement between UNDP and the Government of Botswana for the Provision of Support Services. The manner and methods of cost-recovery by UNDP country office in providing the support services are specified in the attachment to Section IV, Part VI in the same document.

The Government co-financing of 19 million Pula was to be administered under the responsibility of the Ministry of Mines, Energy and Water Resources. Monitoring procedures for the administration of the co-sharing contribution will be detailed at the outset of the project and agreed.

While this has been the high level agreement outlined in the GEF Project Document, the reality on the ground is quite different. Firstly, the evaluation consultant did not find an organogram indicating a formal project structure. The BPC Project Manager by hand drew one which shows that the positions of the Project Engineer and Business Development Manager had left the project mid-way and their positions were not filled in. Subsequent interview with the CTA revealed that the organogram was updated in the Inception Report and made available to the PSC (2007/08) to reflect on the changing staffing arrangement. However, there was a lack of clarity in the structure and commitment of the parties to implement the structure. And in some cases difficulties of the staff to overcome personal differences. Even when the Business Development Manager was part of the project team there was a conflict between her and the Project Manager on their respective roles, which in her opinion overlapped. The CTA who was highly regarded and judged to be highly competent played a catalytic role but left the project after two years. The current BPC Project Manager is third in such position, previous ones having left as a result of promotion in the restructuring of BPC, adding to the lack of the continuity of project management. This was and has been aggravated by the fact that the BPC Project Manager wears many hats and as he admitted in the interview with the evaluation consultant, he can devote at the best 40% of his time to the project. A number of stern requests from the UNDP CO as evidenced by 2007 Exception Report and subsequently in the Project Coordination meetings, to have the BPC project staff to be seconded on a full time basis have been ignored.

The BPC Project Manager admitted that the only way for the project to be run effectively is for the project manager to work on it full time. This was corroborated during the interviews by frequent interruptions due to his colleagues working on rural grid-connected projects seeking his input.

As documented in the Project Inception report (2007), the project was several months behind. A proposal was put forth to the PSC to form an Interim Project Implementation Unit (PIU) and staffed by skills transfer from BPC on a full time basis. It was further proposed that the management of the government budget and other management responsibility such as recruitment, disbursement, procurement, should be handed over to UNDP. The proposed PIU was not formed and the project continued to suffer from lack of dedicated staff. The UNDP GEF Regional Technical Advisor (RTA) was informed by BPC senior management that the time of the BPC Project Manager devoted to the project would remain the same due to other priorities.

Issues faced by the Project were pointed out as early as in 2007 in the Exception Report:

- It alerted the PSC that the project was not progressing as planned in the Inception Report of July 2006 (which was delayed as compared to the Project Document was signature in October 2005).
- Key issues included: Insufficient staff resources, delays in recruitments (4-5 Months), shortfall in Project Management capacity, excessive delays in procurement in BPC process.
- Recommended to establish an Interim Implementation Unit (IIU) for at least 18 month period and let UNDP take the responsibility for recruitment, manage the funds and procurement, provide skilled transfer from within BPC staff.
- All BPC staff to IIU to be dedicated on full time basis and eventually IIU to hand over to BPC for the project and take over management, financial and procurement.
- Alternatively to modify the project scope and targets to reduce components achievable with available time.
- Interview with the UNDP Project Manager revealed that:
  - The IIU was not set up and actions were taken only partially: A solar PV Engineer and a Business Manager were recruited. In hind sight, while it was true that there was a shortcoming in technical capacity that the two new positions filled in, the real need was to find someone to carry out the project management in a diligent manner – needed a full time person to prepare work-plans and close implementation follow-up of actions in the log frame.
  - BPC Project Manager already had too many other projects under his responsibility and no amount of pushing from UNDP side was helping. In 2010, UNDP RTA got an honest feedback from senior BPC official that PM would not be able to devote any more time than what he was already spending.
  - Regarding what change is needed: A new structure where roles need to be rearranged and re-defined. While BPC Lesedi should lead on the Technology Package Outcome 1, but should be also responsible as a private company for market awareness at house hold levels and not just Council level, training, etc. They should do mass communication via TV and radio, and not only through the Franchisee. UNDP has advised BPC Lesedi a number of times to advertise the hot bags though they have done a demo at Kgotla and a trade fare. Hot bags is a “flyer” for UNDP as it is supposed to help with the delivery of energy services in gender sensitive manner in the project and not just energy for men to watch the TV.
  - On the policy side, while EAD is in the driver seat, BPC Lesedi should also stay engaged, e.g. in defining the IPP model, active member in the PITSO, develop position papers, setting the standards,
  - Project spent some money on helping the Botswana Bureau of Standards (BOBs) to set standards on PV. This is a barrier removal project, not many people know how to install PV equipment, standards to be used in training.
  - EAD should be doing awareness building at higher level on Energy Efficiency, Energy Mix, New/Clean Energy, etc. While they should not be advertising BPC Lesedi products, EAD can advertise the technology; create a platform for exhibition of products, policy engagement, etc.
  - And the role of BPC should be on the project management, while all 7 components are important, Component 1 to be left to BPC Lesedi. The LFM needs to be revised accordingly.
  - GOB injected 7 million Pula into the company from the pre-approved GOB fund for the project. But beyond this, financial sustainability of the project may be in jeopardy especially if the GEF funding



stops, and there exists signs of “impeding success” lacking and some feel that government may not be backing a “winning horse”.

- If a Mid Term evaluation had been done, the project could have made a turn around and could be far ahead in its achievement, and especially so if the focus had been on strengthening the Project Management and not just on technical issues.

Follow up interview with the UNDP Project Manager also brought out that while the need to establish a dedicated Project Implementation Unit was desirable, as a hind sight, more emphasis should have been placed on the day-to-day project management rather than just filling in technical skills.

Following the establishment of BPC Lesedi, BPC Project Manager believes it is no longer necessary to have other functions with BPC as BPC Lesedi has created similar positions. However interviews with BPC staff for example responsible for consumer awareness and satisfaction of rural clients and separately with BPC Lesedi officer in charge of Marketing, it appears that there are overlaps. It is therefore recommended that a new Project Structure be established including defining individual roles and responsibilities, and interactions.

Lack of a dedicated project structure is one of the primary causes contributing to a slow project start and follow up to many important issues such as timely recruitment, preparing budget advance requests, low M&E, etc.

### 3.2 Project Implementation

#### **The logical framework used during implementation as a management and M&E tool.**

As discussed under the LFM analysis in section under Project Formulation, one workshop was held early in the design stage in 2008 followed by a second workshop in early 2010 to refine the log frame, however, as has been documented in the PIR (2010) and 2010 Project Quarterly Progress Reports, the implementation of the revised LFM is waiting the purchase of a web-based system whose procurement will be approved by UNDP only if the project is granted an extension beyond planned completion date of December 31, 2010.

#### **Stakeholder participation**

The stakeholder participation in the project implementation is rated as **UNSATISFACTORY**.

While the stakeholder participation as reflected in the GEF Project Document (2005) during the project formulation was judged to be satisfactory, review of the minutes of the recent PSC meetings show that several important stakeholders indicated below have not been attending the meetings.

- Ministry of Minerals, Energy and Water Affairs – Planning Unit;
- Ministry of Finance and Development Planning (MFDP);
- National Conservation Strategy Agency;
- Rural Industries Innovation Centre;
- Department of Meteorological Services;
- Somarelang Tikologo (NGO);
- A representative of the private sector active in Solar Energy – preferably a representative from for example an association that represents the entire Solar Energy sector; and
- Botswana Technology Centre

It appears that while the level of the stakeholder participation was good in the beginning and up to 2009, the project did not involve the above relevant stakeholders to seek their participation in the subsequent phases of the project design, implementation, and M&E as indicated by the attendance records. The project did implement appropriate outreach and public awareness campaigns until BPC Lesedi was formed. Now it is not clear as to who should be leading this activity. One interviewee remarked that BPC's outreach is done by the same person responsible for grid-connected projects which may result in bias against the solar PV electrification as most people may opt for grid connection.

The evaluation consult also did not find any evidence via review of the project coordination meetings or progress reports of the project consulting on a regular basis Non-Governmental Organizations or Community Based Organizations, the private sector entities, and academic institutions, to make use of their skills, experience, and knowledge of in the design, implementation, and evaluation of project activities. Academic institutions were involved in the development of the curriculum for the training but are not involved in the overall project.

There is also no evidence that the project took into account via consumer survey or other means the perspectives of those who would be affected by project decisions or those who could affect the outcomes and those who could contribute information or other resources to the process. If any such document exists, it was not made available to the evaluation consultant.

The project does not seem to have identified the relevant vulnerable groups or powerful supporters and opponents of the processes of their proper involvement. Briefings of the Councilors who are part of the local government at the district level have been documented but no follow up seems to have been made.

No interviews with these institutions were established though attempts were made by the UNDP and BPC Project Managers. It was stated that the NGOs and CBOs participation was hindered by their lack of funds to pay for their transport to meeting venues. It is therefore recommended that the BPC Project Manager should strive to involve NGOs and CBOs particularly women's groups in the project implementation. Regarding the non participation of donor agencies, the evaluation consultant was informed that there is no substantial presence of key donors in Gaborone such as embassies or consulates.

It is further recommended that the Project develop a comprehensive stakeholder plan to involve a broad range of players to involve them actively in the project implementation.

### **Role of Executing Agency (EA) and Implementing Agency (IA) and Effectiveness of partnerships arrangements with relevant stakeholders**

As noted in the Management Arrangement section above, the collaboration between the various key players of the project, specifically the EAD, BPC and BPC Lesedi is less than desirable. As evident from review of internal memos, interviews with project staff, the role of individuals within their own organizations and interactions with each other is not clearly evident or not fully decided. For example, an interview with an EAD project staff shared a memo from the EAD Director to the BPC Lesedi CEO demanding that they submit to EAD a monthly progress report on installations of the solar systems. BPC Lesedi lamented that they did not think they should report to EAD while they function as a private entity. The EAD also indicated that they are not comfortable about lack of information on the source of procurement of PV equipment by the BPC Lesedi. EAD feels that this is still a government project and is concerned if PV equipment conforms to the international standards and whether the equipment is being purchased from a French manufacturer (Telesol) based in Cape Town because of EDF's vested interest. The BPC Lesedi allayed EAD's fear by

saying that all Telesol equipment met the South African Bureau of Standards (SABS) which in turn conforms to the international standards.

While at the same time, BPC Lesedi feels that they are not the only ones to carry out the awareness and perception changing campaigns. They should be responsible mainly at the consumer level while EAD should be responsible at the local government and higher level. While both EAD and BPC Lesedi have a role to play in the awareness building, there is a need to create a structure outlining roles and responsibilities of the various parties.

In terms of relationship between BPC Lesedi and BPC and UNDP, evaluation consultant was told that it sometimes they experience long delays or rejection of their requests for funding from UNDP. For example, BPC Lesedi indicated that UNDP did not act on their request to fund a consultancy to carry out a survey on the impact of efficient wood stoves on the community. BPC Lesedi also indicated that the GOB also took a long time (almost 9 months) to release the injection of 7 million Pula into BPC Lesedi account. EAD indicated that BPC Lesedi did not follow the correct procedure- request went to BPC while it should have gone to EAD.

Above are just a few symptoms of lack of clear understanding of respective roles and responsibilities. This needs to be better defined and agreed upon so that on one hand BPC Lesedi can operate as a private entity as intended, but on the other hand that the GOB also has a stake in the project and the implementation of Components 2 to 6 is a joint responsibility and only collective and simultaneous progress on these components would enable BPC Lesedi to successfully scale up installation of solar systems.

It also does not appear if there was an appropriate focus on results by the IA & EA. The adequacy of IA & EA supervision and the quality of risk management by them seems to have been lax. Responsiveness of the managing parties to significant implementation problems as discussed above, quality and timeliness of technical support to the project team were lacking. As noted previously, salient issues regarding project duration, for instance to the project delays noted in the Inception Report (June 2006) and the Exception Report by UNDP (2008) pointing out serious deficiency in project staffing and dedication discussed above, were not addressed, all of which contributed to project outcomes and sustainability.

## **Financial Planning**

As can be derived from the Table 2 below, the project has spent about 48% of the allocated GEF budget. Over the past year the UNDP CO have and also previously in the exception report in 2008, without much success made a number of efforts to make project stakeholders aware of the seriousness of the situation and the need to address the major shortcomings of the project. Likewise only 41% of the Government (co-financing) budget has been used for the project. Overall expenditure is 45% of the total budget allocated for the project or 55% balance unutilized.

As can be seen in Table 4 which present expenditure by years, the expenditure rate was very slow.

**Table 2 : Financial Information by Components (covering period of inception till May 2011).**

<b>Outputs</b>	<b>Budget</b>		<b>Expenditure</b>		<b>% Balance</b>
	<b>GEF</b>	<b>GOB</b>	<b>GEF</b>	<b>GOB</b>	
1.	698,347	1,081,650	470,387	509,209	45
2.	434,798	94,022	447,322	247,000	15
3.	193,744	222,083	85,030	64,535	64
4.	543,303	160,000	133,862	15,624	74
5.	144,508	45,000	11,176	-	94
6.	211,453	-	-	6,670	97
7.	185,329	-	-	58,857	68
Subtotal	2,411,482	1,602,755	1,147,777	655,142	
<b>Total</b>	<b>4,014,237</b>		<b>1,802,919</b>		<b>55</b>

**Table 3 : Financial Information by Components (covering period of inception till May 2011).**

<b>Years</b>	<b>Budget</b>		<b>Expenditure</b>	
	<b>GEF</b>	<b>GOB</b>	<b>GEF</b>	<b>GOB</b>
2006	365,498	-	89,108	-
2007	361,537	365,605	263,873	55,585
2008	1,172,700	534,420	533,025	487,496
2009	389,150	212,500	212,502	40,243
2010	105,100	-	97,500	-
2011	17,497	490,230	17,296	6,291
Subtotal	2,411,482	1,602,755	1,213,304	589,615
<b>Total</b>	<b>4,014,237</b>		<b>1,802,299</b>	

### **Cost -effectiveness**

- As indicated in the results of the 2008 and 2009 Project Audits, the project did comply with the incremental cost criteria (e.g. GEF funds to be used to finance a component of a project that would not have taken place without GEF funding as defined in the Incremental Cost Matrix in the Project Document) and securing co-funding from the GOB.

- The project has not completed most of the planned activities and nor met the expected outcomes in terms of achievement of Global Environmental and Development Objectives according to schedule, and as cost-effective as initially planned.
- The project did not use either a benchmark approach or a comparison approach to ensure that it did not exceed the costs levels of similar projects in similar contexts.

### **Monitoring and evaluation (\*)**

M&E is rated as **Unsatisfactory**.

- The GEF Project Document (2005) contains an elaborate structure for Monitoring & Evaluation (M&E) and the roles and responsibilities are well articulated. However, baseline conditions and its methodology were not established. The Project Document did not articulate in sufficient detail how the project results were to be monitored and keep track of progress toward achieving the objectives.
- The LFM was revised in 2008 in a participatory manner with more project specific indicators.
- The LFM was further elaborated in early 2010 based on SMART<sup>3</sup> indicators by a joint venture between Danish and local consulting firms in form of an Energy Sector Monitoring System for the specific use of BPC Lesedi. However, the new system has yet to be implemented awaiting the purchase of a web-based software that would be approved by UNDP only if the project is granted an extension. No data analysis systems or evaluation studies at any specific times in the project to assess results were noted.
- Despite the fact that the M&E plan at entry was adequate, and that sufficient funds were allocated for program M&E activities, a shortcoming in M&E relates to an ineffective use of the Logical Framework. Evaluation of RERE project revealed that the Logical Framework was not utilized to its full extent as a tool for programming and sequencing the activities of the project, as well as using it to guide M&E. For instance, few key outputs were not evaluated in sufficient detail. One lesson learned is that making better use of the Logical Framework for the purpose it was set out for – i.e. sequencing and programming of project activities and to assess project performance – would have enhanced the delivery quality of RERE project. The reason for this shortcoming lies with the members of the Project Management team either lacking the knowledge or less commitment to using the Logical Framework to its full advantage and/or not taking on board the advices provided by the UNDP CO;
- The short comings primarily stem from the lack of clearly defined roles within the management structure of the project.
- Lack of baseline data which was to be established at the inception of the project also made it difficult to benchmark the outcomes.
- As indicated in the interview with the Assistant Resident Representative, M&E by UNDP also took a back seat due to shortage of project staffing and also several other competing priorities. Until 2009, the M&E was the responsibility of the Project Manager reporting to the Deputy Resident Representative. From the beginning of 2010 and in restructuring to alleviate some burden on the Deputy Resident Representative, the Assistant Resident representative was made the focal point of the UNDP M&E with subordination by the Project Manager. This later arrangement is supposed to improve the M&E by UNDP.

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<sup>3</sup> SMART: Specific, Measurable, Achievable, Realistic and Timely.

- While most progress and financial reports were generated, in compliance with the M&E requirements, quality, level of details and timeliness of reports have not been good; for example the 1Q 2011 progress report was delayed significantly.
- There is little evidence of the value and effectiveness of the monitoring and evaluation reports and evidence that these were discussed with stakeholders and project staff. The follow-up actions, and/or adaptive management, were slow in responding to monitoring reports (PIRs) ;
- Several M&E activities have throughout the life of the project have not been timely. For example, the UNDP CO indicated that the advice provided to the Project Manager has not always been taken up, leading to lack of timely completion of some the necessary reports (e.g. year end project reports, quarterly progress reports, PSC meetings minutes, etc). The UNDP comment on PIR 2010 is a good example.
- The mid-term evaluation (MTE) was not carried out. It is therefore not possible to check the consistency of the PIR self-evaluation ratings with the MTE. UNDP Assistant Resident Representative could not offer any explanation other than that it was over-taken by other priority items. If a mid-term evaluation had been carried out, it is possible that the project could have benefited from corrective actions to bring the project back on its track.

### **Adaptive Management**

There was one significant change in the project formulation phase whereby the subsidy model was dropped and a fee-for-service model was adopted. However, the evaluation consultant learned this only from the interviews. The project change was not articulated in writing and then considered and approved by the project steering committee.

There were no changes in the development objectives of the project during implementation.

No mid-term evaluation was conducted which could have placed the project on a correct path. However, on the other hand, as one interviewee remarked that only if the mid-term evaluators had been aggressive and diligent, any extensive material changes to the expected project outcomes would have occurred. What was needed was a full time dedicated commitment on key project staff.

Learning and adaptive management processes, particularly for the capturing of lessons and the maintenance of updated project statistics (e.g. sales figures, system faults, success stories, etc), should have been done on a regular and structured manner for the project to be able to draw best practices.

### **Execution and implementation modalities**

The project is being executed by the Government of Botswana, under the UNDP National Executed (NEX) modality. The EAD of the MMEWR is serving as overall executing agency for the UNDP/GEF full-scale programme. BPC is the implementing agency. For the day-to-day operation of the programme, one full-time advisor was made available (but left in mid 2008), fully funded through GEF. The Chief Technical Advisor was under the overall management of BPC. In addition, the Tripartite Project Steering Committee (PSC) which was set up to steer the implementation of the PDF B activities will continue to function throughout the life of the proposed project.

### **Management by the UNDP country office**

There are several examples which demonstrate that the UNDP CO could have played a more prominent role in the management and oversight of the program.

- As indicated in the interview with the Assistant Resident Representative, the UNDP CO could have carried out better oversight of the project by working more closely with Project Coordination Working Group on M&E aspects of the project. However, the new management arrangement transferring the responsibility from the Deputy to Assistant Resident Representative was intended to improve the performance of the UNDP CO. This critical self-assessment by the UNDP CO clearly demonstrates its willingness to learning from this lesson so that it can more effectively provide oversight on future projects/program.
- Some examples where UNDP could have provided better oversight over the end-users satisfaction to know more about any constraints they were experiencing concerning the delivery of solar systems such as after installation services, faulty or malfunctioning equipment. A consumer survey could have provided this better insight.
- In the case of processing the advance payment requests, in most cases the delay was due to slow progress of BPC in providing the quarterly reports and budget. In the early days UNDP was often not pushing for this although this certainly improved as the project progressed. BPC always complained with regards delays, but in general it was problems in their reporting.
- One area where UNDP CO did not perform well was in the recruitment of international appointments. There was a substantial delay in this process. For example the recruitment of Chief Technical Advisor is a case in point where the project had already been running for almost a year before his recruitment was finalized. This was not entirely UNDP's fault as BPC and GOB would often delay in terms of finalizing TORs etc.
- UNDP Botswana was late to realize the complexities of the project and the need for close follow-up and high-level support, but overall the support provided was overall good. After the big delay in the recruitment of the CTA which was due to a thorough screening process undertaken in close consultation with the government, recruitment of the Business Development Manager and the Project Engineer was much faster. The procurement was undertaken smoothly and as fast as possible (minimum lead time required to comply with procurement UNDP's procedures).
- According to BPC Project Manager, requests for purchases at times took much longer than promised/anticipated. In the RE Botswana case, the senior official is a programme manager responsible for other hectic climate change projects, hence the delays in decision making. He admitted that BPC also suffered the same fate as we did not have a dedicated structure for the project.
- Some good practices were put in place by UNDP CO JPO who responded to the shortcomings in project management from BPC by clearly defining them in the reporting and budgeting requirements and providing a lot of face to face support to the UNDP Project Manager. The JPO attended the weekly project management meetings, which was beyond the normal role of a CO under NEX modality.
- BPC Project Manager acknowledged that the UNDP guidelines to invitation to tender documents were detailed and very helpful in making decisions for awards. BPC can adopt some of these to improve their procurement procedures.
- In terms of any bad practices of the UNDP CO, during the project formulation there was insufficient attention to the capacity of the BPC to manage the project. Had a proper Capacity Assessment been conducted then it would have been recognized earlier that management support was required. This resulted in lost momentum at an early formative stage which undermined the credibility of the project in the organization.

- BPC Lesedi CEO indicated that the UNDP has to this day not given answer as to whether the long request training of trainers for franchising will ever happen. This is a very important element of the franchise approach adopted. Necessity for training according to him should be determined at operations by the supervisors of staff to be trained not by funders.
- Interview with the BPC's former Chief Technical Advisor indicated that at times his request for the UNDP Deputy Resident Representative to intervene with highest government official (Minister of MMEWR) to push the project was not forthcoming.

### **Coordination and operational issues**

It has not been possible to fully evaluate the Coordination and Operational issues of the RERE project with other national projects in order to meet the development objectives. Other than GOB there are no other co-financiers invited to participate in the project, in particular any donors active in the RE field. The GEF National Focal Point in the interview indicated that she was not aware of the project and had never been invited to any of its meetings. There was also no obvious coordination with the Department of the Meteorological Services charged with the development of the GOB's communication to the UNFCCC on climate change.

It is interesting to note the overall conclusion from the GEF Council meeting in 2005 that approved this project, *“Further concerns are related to the unclear cooperation and coordination with other initiatives in the field of PV-based rural electrification, as well as the focus of the project mainly on PV, thus excluding other renewable energy sources. Furthermore, project activities should be coordinated with other initiatives wherever possible in order to avoid duplication. While providing support for improving the policy framework for renewable energy sources, all possible renewable energy sources should be taken into consideration”*.

One good example of coordination at the national level includes the RERE Project's sponsorship and participation in the development of a Thematic Report (January 2009) based on a workshop to consult the stakeholders on the Department of Energy 2006 first Draft National Energy Policy. The formulation of the draft policy involved extensive consultations of the stakeholders involved in the different sub-sectors i.e. electricity, coal etc. Although the draft policy was subsequently approved by Cabinet it was never tabled before parliament for discussions because it was deemed deficient in certain aspects. In September 2008 the Department commenced a review of the draft policy. For this purpose a two pronged approach was adopted comprising of consultations based on sub-sectors (Electricity, Petroleum and Gas, Coal, Biomass, New and Renewable Sources of Energy and Energy Efficiency and Conservation) and thematic areas. Three themes were identified namely Access to Energy Services, Market Mechanisms and Resources and Supply. With the support of the RE Botswana Project an independent consultant was engaged to facilitate and support the Task Forces on day to day basis. The Chief Technical Advisor, RE Botswana Project, provided specialist input and facilitation during the process. In total four Task Forces meetings, six focus group meetings and three Kgotla meetings were held from the 28th October 2008 to 20th November 2008. On the 4th December 2008 a stakeholder workshop was held to consolidate outputs from the abovementioned meetings and the sub-sectoral consultations. In total there were 77 representatives from government, parastatals and private sector participating in the consolidation workshop. During the workshop the Team Leaders of the three Task Forces made presentations on policy issues identified during the Task Forces meetings, focus group meetings and kgotla meetings. This was followed by the consultant's presentation of issues identified during the sub-



sectoral consultations. The consultant also made a presentation of the proposed consolidated goals based on all the consultations. The participants were divided into four groups and assigned three goals and were requested to come up with specific wording for the goals as they would like to see in the policy document. At the end of the workshop twelve goals were adopted.

While the activity described above is commendable, the policy has yet to be approved by the Parliament. The services of an international energy consultant recruited by UNDP to assist EAD were not used. The consultant declined to be interviewed on the grounds that his contract had not been respected and he did not receive any payments. The UNDP Project Manager indicated that it was up to EAD to prepare and manage work-packages for the consultant in line with the contract. It appears that the operational issues were not dealt in a satisfactory manner and EAD is now looking for another consultant.

### 3.3 Project Results

This section discusses the assessment of the project objectives and outcomes/outputs against the targets as defined by key indicators in the log frame matrix at the Inception Phase of the project. The assessment is summarized in tabular form. The rating is based on a 6-level sliding scale from 'Highly Satisfactory' degrading to 'Highly Unsatisfactory' as per the TOR. The ratings of outcomes and outputs are related to their relevance, effectiveness and efficiency as defined in the Guidelines for GEF Agencies in Conducting Terminal Evaluations..

The main findings concerning an evaluation of the achievement of objectives, outcomes and outputs are now presented below and also summarized in **Annex 7** in a tabular form following the Logical Framework.

#### *Attainment of objectives (\*)*

##### **Immediate and development objectives of the project**

This evaluation has found out that the attainment of the global goal and development objective of RERE project was not quantified as expected, which represents a major shortcoming of the project. The project has not made sufficient progress and certainly not on replication dimension at a scale that would allow assessment of Global and Development objectives stated below. Plus lack of quantifiable baseline data (that the GEF Project Document stated was to be collected during the design phase) and delays in procurement of web-based M&E system makes it impossible to compare the current state with that at the beginning of the project.

Hence, the attainment of both objectives has been rated as **Unsatisfactory**.

**Global objective:** To reduce Botswana's energy related CO<sub>2</sub> emissions by substituting fossil fuels (petrol / diesel, wood fuel, paraffin and coal) with PV and LPG, for the purpose of providing basic energy services to rural homes and community users.

**Development Objective:** To improve people's livelihoods by improving their access to and affordability of modern energy services and assist the Government of Botswana with the initiation of a renewable energy program for the rural areas, thus reducing the dependency on imported fossil fuel.

These objectives would be achieved by project activities designed to remove barriers to the wide-scale utilization of PV and LPG for providing energy services. The project will consider the institutional, financial and market instruments necessary to demonstrate the viability of using the private sector to participate in the process of sustainable development in rural areas through the delivery of basic energy services through PV and LPG.

### ***Outcomes and Result Expected***

The original project consists of **six** components. Each of these six components is composed of an immediate objective, specific output(s) and a number of activities. A seventh component related to the Monitoring & Evaluation was added at a later stage. By achieving these immediate objectives, the project was expected to contribute towards the achievement of the global and development objectives.

**Outcome 1 is rated as Unsatisfactory.** While good progress is being made in the past few months, the actual achievement against the project target for SHS is around 18% and less than 2% for lighting and cooking appliances. The mini-grid is still at the design phase and not even been tendered yet though a site has been and appropriate budget have been allocated. A lot more needs to be achieved to meet the project target. At the rate the BPC Lesedi regional Offices are being opened up and franchisees are being set up, it will be more than two or more years before the targets would be met.

Lower than expected progress on this Component is also due to the significant delays in finalizing the franchising packages and appointment of franchisees. Two of the four franchisees were interviewed in the field that has set up franchising office. Only one has been branded with BPC Lesedi colors. Further discussion is given under Component 5.

**Outcome 1: Delivery of technology packages:** To implement three different delivery models targeting different end-user groups and making use of different PV and PV/LPG-based technology packages.

- **Output 1.1:** In 88 villages, 5,152 households will be offered basic lighting and cooking facilities.
- **Output 1.2:** In 88 villages, 1,373 households will be offered SHS.
- **Output 1.3:** In one village, a mobile PV mini-grid will be installed, operated and closely monitored.

BPC Lesedi continued to roll out of products and services around the Gaborone areas. During the reporting period through March 2011;

- 63 solar electric systems were installed bringing the total to date to 242 (through May 2011)<sup>4</sup>.
- Installed recharging stations remained at 3.
- 6 efficient wood stoves were sold bringing the total sold to date to 242 (May 2011 figures are not available).
- 80 rechargeable lanterns were sold bringing the total sold to date to 360

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<sup>4</sup> It was observed that no regular monthly progress reports are being generated to capture the figures on SHS installation and sales of other items such as rechargeable lanterns, efficient wood stoves and hot bags. The evaluation consultant was provided a copy of the letter from the EAD Director to BPC Lesedi CEO urging the reports be prepared starting month of June 2011.

- 3 hot bags were sold bringing the total sold to date to 23

A study on user acceptance and perception of the efficient wood stoves was finalised and the final report submitted by EECG the appointed Consultants. The submission of the final report was preceded by presentation of the draft final report which allowed the Consultant to obtain feedback from industry experts. (see interview with BPC Biomass Officer for more details on the report).

Following the completion of the pre-feasibility study in June 2010, design of the mini grid in the selected village is underway with reticulation design completed and generator design only at load determination stage. Electric power generation is proposed through one 9kW Sterling Dish unit for daytime supply combined with one 9 kW Sterling CHP unit supplied by biogas from for evening and night supply. Power generated by these Sterling units will be fed to the micro-grid through a 9 kW inverter for the stabilization of system voltage and frequency.

**Outcomes 2: Policy support and policy framework:** To assist with the development of policy and institutional arrangements conducive for the integration and provision of off-grid electricity services within the existing rural grid electrification program.

This Outcome is rated as **Marginally Unsatisfactory**. The development of policies is still at draft stage in spite of a long period of consultation and project support and participation. EAD Senior Policy official indicated that it is to be updated to satisfy the Parliament. UNDP had recruited an international consultant to assist the policy update but his services were not utilized. No clear deadline has been set. While the draft policy contains adequate aspiring language regarding renewable energy, no clear plan on the implementation of the policy or the follow up development of the Renewable Energy strategy exists.

- **Output 2.1:** A policy and implementation framework for renewable energy-based rural electrification (mainly PV systems) will be defined and is in place.

Renewable energy-based rural electrification activities have been integrated into National Development Planning – NDP10. It is not clear how much of GOB’s future budget is allocated for solar PV based rural electrification.

The project participated actively in the formulation of the National Energy Policy. Energy Sector Policy after extensive consultation is at a draft stage since November 2010. It needs to be revised to conform to the level of analysis expectations by Parliament. No specific deadline was available from EAD. While the draft policy adequately addresses renewable energy aspirations, the development of a renewable energy strategy has not been initiated.

The Gender Action Plan (GAP) was adopted by the BPC Executive Committee following a presentation by ENERGIA. Any concrete actions regarding the actual implementation of the ENERGIA Gender mainstreaming project is not clear though the progress report indicates that it continued as planned. UNDP attaches high importance to gender equity and gender mainstreaming.

- **Output 2.2:** Standards for PV and PV/LPG components and systems will be updated and their use enforced.

It has not been possible to fully assess this activity due to conflicting information. On one hand the PIR 2010 records that several PV related standards have been established by the Botswana Bureau of Standards (BOBs). However, the evaluation consultant was not able to meet and discuss with anyone in BOBs to confirm this and any actions related to their enforcement. Interviews with the BPC Lesedi Operations Manager and also its PV Technical Officer revealed that they are not aware of the BOBs PV standards and were relying on the South African Bureau of Standards (SABS) which are considered to be in line with the international standards. Subsequent interview with two private solar PV vendors (Solar International Botswana and Solar Hart) also indicated that the BOBs standards do not in exist nor being applied and there is no enforcement.

Experience from previous similar project in other parts of the country (e.g. Tanzania) and lessons learned from IFC (2007) and World Bank and GEF (2000) clearly indicate that it is very important that before large scale replication of PV appliances takes place, proper standards and quality control measures should be instituted to prevent inferior equipment finding their way into the country. Premature failures or low performance of inferior equipment would give a bad reputation to the solar PV industry and abatement of consumer confidence in PV products.

**Outcome 3: Awareness raising and changing of perceptions:** To increase awareness and change perceptions among the general public, decision-makers and rural consumers on the potential role of PV and LPG in meeting basic energy needs.

This Outcome is rated as **Marginally Satisfactory**. While good progress is being made by BPC Lesedi, much more needs to be done. Coordination with EAD and BPC in awareness raising and changing perception needs to be strengthened and any ambiguity in roles and responsibilities should be resolved. The interview with the EAD Project Manager and the EAD Communication Officer revealed that a draft Communication Strategy has been developed and needs to be formatted. It should make the strategy and respective roles clearer. The evaluation consultant was not provided a copy. A difference in opinion exists between EAD and BPC Lesedi's approach to awareness building. EAD Communication Officer feels that the awareness raising should be nationwide and not done in piecemeal while BPC Lesedi is focusing on region by region so that they do not get overwhelmed and fall short of public expectations when it is time for installation. While both points of view are valid, there is a need for a closer coordination between the Marketing Officer of BPC Lesedi and EAD Communication Officer. The latter indicated that she was not being invited to participate in BPC Lesedi's awareness dissemination. Interview with the BPC Lesedi Marketing Officer indicated that he had just returned from awareness building in the Ghanzi area but when asked about the next area, he indicated that it is on rolling plan basis and he has yet to plan where he was going to direct his next effort.

- **Output 3.1:** Awareness program for decision-makers will be developed and implemented.

The Minister of Minerals Energy and Water Resources recently visited the villages where the initial rollout was undertaken during the first quarter of 2010. The Minister was impressed by the products and services being offered and wishes to see this covering the greater part of the country. Other senior officials of the Energy Affairs Department have also visited the villages where the products and services have been rolled out. However this does not meet the target of 20% of the villages having been visited. First BPC Lesedi franchising office with its branding colors was inaugurated by the Minister of Minerals, Energy and Water Resources in April 2011.

While such visits are useful, the evaluation consultant feels that they are purely symbolic. More tangible outputs would be accelerating policy development which has been lagging for a long time.

- **Output 3.2:** A rural customer awareness program will be formulated and implemented.

The following was extracted from the 1<sup>st</sup> Quarter Progress Report:

- BPC Lesedi made a presentation to Parliament on the 26<sup>th</sup> March 2011.
- BPC Lesedi also appeared on the Botswana Television special program that was dedicated to the Earth Hour Initiative, themed Earth Hour and Beyond. BPC Lesedi also took part in the exhibition for the earth hour event held in Gaborone on the 26<sup>th</sup> March 2011.
- BPC Lesedi attended eight kgotla meetings in the franchise areas. At these meetings many people showed interest in the BPC Lesedi products and services.
- BPC Lesedi conducted door to door campaigns at Molapowabojang, Gaphatshwa and Hatsalatladi. 40 people showed interest in the BPC Lesedi products and services

The interest for PV based systems is very encouraging judging by the many inquiries received at various forums. These include village meetings, exhibition fairs, agricultural shows, BPC offices and BPC Lesedi offices. Enquiries at BPC, Energy Affairs Division and BPC-Lesedi have increased by more than 300% per week since the start of the project.

As stated previously, the evaluation consultant feels that such activities should also involve EAD Communication Officer and also BPC Consumer Relations Officer.

**Outcome 4: Private and public sector strengthening and training:** To strengthen and support the public and private sector working in the PV and renewable energy sector to provide better quality of service.

This component is rated as **Marginally Unsatisfactory**

- **Output 4.1:** Business development services in the renewable energy sector (mainly PV) will be strengthened.
- **Output 4.2:** Technical knowledge of PV and PV/LPG systems will be strengthened.
- **Output 4.3:** The ability of the public sector and para-statal to provide a policy framework and assistance to further renewable energy-based rural electrification (notably PV) will be strengthened.
- **Output 4.4:** An association looking after the business interests of the PV sector will be set up and is operational.

The 1<sup>st</sup> Q Progress Report and other recent reports indicate that “Following the assessment of training needs for BPC, BPC Lesedi and EAD employees, prospective training institutions were identified. Training proceeded in the respective organisations as and when the need is identified”. But no details were provided. What is contained in the Dropbox is quite old. BPC Project Manager should be keeping a record of such training and also reports on training as to what was learned, information exchanged and how lessons are being applied. All such activities would lend to support Component 6 on Replication and Sustainability.

**Outcome 5: Financial engineering:** To assist with the development of appropriate financing mechanisms for the larger scale dissemination of PV-based technologies to rural customers.

This component is rated as **Unsatisfactory**.

- **Output 5.1:** A financing scheme to reach rural customers will be designed and implemented.

On positive side, Franchising scheme has been designed, BPC Lesedi has a business plan and various operational policies and procedures have been completed. Three franchisees have been identified of which two of them have signed the franchising agreement. One of them has undertaken a business development training offered by the Local Enterprise Authority while the other franchisee has been exempted from the training because of his past association with LEA as one of their course facilitators.

The interview with the Director of LEA Corporate Services indicated that the MOU that was discussed by BPC with LEA was never signed. LEA felt that there is no need for an MOU and the training can be designed to suit the needs of the franchises. LEA first screens the candidates to assess their background, needs based on business application, etc before accepting them for training. The evaluation consultant notes that the entries in the previous progress reports do not reflect this reality.

In interviews with the franchisees, it was confirmed that BPC Lesedi offers credit for the initial deposit for solar electric systems. Customers have an option to pay the initial connecting fee of 700 Pula (USD100) in 3 installments for the most basic system (Sesowa – 1 panel – 1 battery 80 Wp) . EAD and BPC Lesedi have been discussing with the Bank Gaborone to set up a revolving fund to extend credit to franchisees and potential consumers. The Franchising Pack including brand management contract have been developed to establish the kiosks (shelving, security systems, signage and painting) have been completed and the branding strategy and manual has been completed. 2 premises and 2 pilot kiosks have now been branded with the BPC-Lesedi Franchise Brand. Significant delays experienced previously have contributed to a slow start.

The evaluation consultant in interviews with two of the franchisees learned the process of setting up a franchise. He has to pay 15,000 Pula upon signing the contract and needs to have 80,000 Pula for a vehicle or a vehicle in his possession. He needs additional 30,000 Pula for office administrative cost (rent, secretary, part time installers, etc) and additional 30,000 Pula for initial stock though BPC Lesedi provides two months of consignment with third month on credit. Visits to two franchising offices showed that they are sparsely stocked mostly with rechargeable lanterns and cooking stoves and some solar batteries. One of the franchisee indicated that he had applied for a loan from the Citizen’s Entrepreneur Development Authority (CEDA) but was turned down as his projected sales and revenue were not sufficient to pay his monthly note to CEDA.

In probing the experience and background of the two franchisees interviewed reveals that they have quite different background. One is quite young (in early 20's) recent high school graduate and with an ambition to study law. He has undertaken the LEA training. He has signed the franchising agreement. He applied for a loan from CEDA but was turned down as his cash flow projection does not meet revenue requirement by CEDA. He is currently relying on monthly fees (42% his share while 58% goes to BPC Lesedi) for his income. Though he is spending most of his profit in paying back to BPC Lesedi the cost incurred in receiving the two month worth of stock on consignment. He is therefore running on a very tight financial situation.

The other is older and more mature with good business experience on which basis he was exempted from the LEA training. However, he seems to be wearing several hats and has been an active consultant. It is therefore questionable as to how dedicated he will be to running the new franchise. He has not yet signed the franchising agreement. It also raises a question on what criteria were used in recruiting franchises and if it is different from that of recruiting entrepreneurs.

Other two franchisees had not yet been available for interviews.

- **Output 5.2:** Sustainable (long-term) subsidy schemes for PV and PV/LPG systems will be designed and recommendations on how to implement these schemes will have been made.

The evaluation consultant did not find any visible progress on this Output. In an interview with the EAD it was learned that a Position Paper on subsidy has been prepared and is with the PS but the evaluation consultant was not provided with a copy. EAD could not confirm what the process is to get its approval – does it need to go to the Parliament or can it be approved by the PS? And what is the timeline? The EAD explained that the subsidy budget would come from a 0.5 thebe levy taken out of the currently operating levy fund being collected for rural electrification. This would amount to 1.2 million Pula per month. But it was not made clear whether this subsidy would be directed at the end- consumer or towards the capital expenditure of PV systems which would benefit BPC Lesedi.

**Outcome 6: Learning and replication:** To disseminate experience and lessons learned to promote rapid implementation of rural electrification based on renewable and low GHG technologies throughout the country.

This component is rated as **Unsatisfactory**. Outputs 6.1, 6.3, and 6.4 listed below have not been achieved nor put into action. These three outputs obviously cannot be achieved until substantial number of solar systems have been installed and experience from it learned. Output 6.2 has been achieved and lessons learned from the JICA sponsored three village pilot program have been documented and applied to the RERE project. Some visits have been made by BPC project staff to neighboring countries in SADC but the evaluation consultant did not find any back-to-office reports on what was learned or disseminated.

The project team should be developing strategy on how the project would achieve replication and sustainability. This should be coordinated between EAD, BPC and BPC Lesedi so that it not only reflects BPC Lesedi's business plan but also complimentary activities on the government side in terms of establishing right policy framework to create a level playing field for renewable technology and help remove barriers.

The Project can also learn and document experience and lessons learned from similar experience in other African countries such as the UNDP GEF project in Tanzania, IFC Photo Voltaic Market Transformation Project in Kenya, World Bank project in Ghana, and from Namibia's renewable energy program, etc.

- **Output 6.1:** A program for replication of activities implemented under component 1 will be prepared.
- **Output 6.2:** Lessons learned from the current pilot activities in three villages using fee-for-service with SHS will be documented and used for decision-making on possible continued developments with this delivery model.
- **Output 6.3:** The impact of PV and PV/LPG systems in the project area will be evaluated.
- **Output 6.4:** Support has been provided to disseminate the learning and replication experiences in the project area into the SADC region.

The tender for the software implementation of the Impact Assessment and Performance Monitoring System was re-advertised following a poor response to the first advertisement. It is expected that the web based system will be in place during the second quarter of 2011. This activity has progressed at a very slow pace.

Table 3 below summarizes all the ratings, for the Project objectives, outputs and outcomes and also the Stake Holder Participation, Monitoring & Evaluation, and Sustainability, as required by the UNDP GEF guidelines.

**Table 3: Summary Project Ratings**

<b>Component</b>	<b>Rating</b>	<b>Comment</b>
Global Objective	Unsatisfactory	See Annex 7 for More Details
Development Objective	Unsatisfactory	See Annex 7 for More Details
Component 1: Delivery of technology packages	Unsatisfactory	See Annex 7 for More Details
Component 2: Policy support and policy framework	Marginally Unsatisfactory	See Annex 7 for More Details
Component 3: Awareness raising and changing of perceptions	Marginally Satisfactory	See Annex 7 for More Details
Component 4: Private and public sector strengthening and training	Marginally Unsatisfactory	See Annex 7 for More Details
Component 5: Financial engineering	Marginally Unsatisfactory	See Annex 7 for More Details
Component 6: Learning and replication	Unsatisfactory	See Annex 7 for More Details
Stakeholder Participation	Unsatisfactory	See Section 3 - Implementation



Monitoring & Evaluation	Unsatisfactory	See Section 3 - Implementation
Sustainability	Moderately Unlikely	See Section 4 - Results
<b>Overall Project</b>	<b>Unsatisfactory</b>	

### Country ownership

Botswana ratified the UNFCCC on 27th January 1994. The project has been relevant to the on-going national efforts under Botswana’s climate change program led by the Department of Meteorology which established the Initial National Communications to the UNFCCC (INC 2001) and the preparation of the 2<sup>nd</sup> National Communication in 2006; development of GOB’s Technical Need Assessment (2004) to develop a national mitigation plan and support the development of technologies that reduce GHG emissions, including renewable energy technologies (RETs).

The project contributes to achieve UNDAF objective 1 of the environment area: fulfil its obligations under the global and regional commitments and goals that it has signed. The project is also in line with MYFF 2004-2007 Goals and Service Lines 3.3 “Access to Sustainable energy services”, and wholly meets with one of its Core Results under this Service Lines: “Access to energy services, electricity or cleaner fuels in rural areas increased”. Associated outcome in the Country Programme Document (2003-2007) with the project is “Improved awareness and understanding among decision makers and the public of linkages between environmental sustainability and human poverty and well-being.” The project also contributes to the Country Programme output of “National capacity building of key government institutions, NGOs, and private sector strengthened and improved”.

RERE Project supported the development of the national Energy Sector Policy (draft, Nov. 2010) which recognizes the importance of renewable energy in improving access to energy in rural areas (rural households, businesses, public services and water supply), as well as in generating electricity for the grid and the more rational use of electricity in buildings and for water heating. The policy is awaiting some update to satisfy the Parliament.

The project was developed in close consultation with various key Government Ministries and is supported at the highest political level. The Government attaches high priority to providing basic energy services to its rural communities, as expressed in its National Development Plan 9 and by making USD 3.8 million (19 million Pula) available from its National Budget to implement this initiative in support of this policy commitment. One of the strategic objectives for the energy sector in Botswana relates to reducing the fossil fuel dependency and promoting the use of renewable energy. Other objectives include promoting the development of the private energy sector through private participation and public-private partnerships and studying the potential role of renewable energy, particularly for rural electrification.

The Project Steering Committee (PSC) is chaired by the Permanent Secretary of the MMEWR and the Director of the EAD is a member of the PSC. The Director of the BPC Corporate Services is on the Board of BPC-Lesedi. This high level representation by the government official bodes well for the project.

The GOB has maintained its financial commitment to the project. In addition to the co-financing on the government side, GOB injected first 5 Million Pula into BPC Lesedi and then in March 2010 another 7 Million Pula with promise of similar injections per year for the next 4 years.

The Project assisted the Solar Industry Association of Botswana (SIAB) to develop a business plan to form a permanent platform for a dialogue on policy, standards, and experience sharing in the country. However, after some initial activities, the SIAB is stalling. An interview with its former chair indicated that there was an expectation that BPC or UNDP would provide funds to the association for its administrative and secretariat costs. UNDP CO indicated that this was never contemplated and SIAB is supposed to pay for its operational costs from its own revenues based on in-kind contributions (office, telephone, furniture, secretary, etc), membership dues, seminar fees, etc.

The project is fully in conformity with the GEF Operational Programme # 6: Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs. Its focus is on the strategic priority # 4: Off-grid Renewable Energy for Productive Uses.

### **Mainstreaming**

Due to very limited achievements (less than 10 to 15%) of the project in terms of installation of solar systems so far and lack of baseline database and robust M&E system, it is not possible to identify and define any positive or negative effects of the project on local populations such as income generation/job creation, improved natural resource management arrangements with local groups, improvement in policy frameworks for resource allocation and distribution, or regeneration of natural resources for long term sustainability.

However, the project objectives do conform to agreed priorities in the UNDP Country Programme Document (CPD 2010-2014), with the Program Component 3 on Environment, “This component will strengthen capacity for natural resource management, provision of cleaner energy services, and addressing climate change at the central and local government levels. The component will contribute to Millennium Development Goals 7 and 1. It also conforms to the elements in the proposed Country Programme Action Plan (CPAP, 2010), “Capacity building to access carbon markets; Finance for rural electrification; and Capacity building to review the energy sector policies, etc.”

Botswana’s Vision 2010 and National Development Plan (NDP) 10 (2010 – 2016) recognize the importance of environment and natural resources within the context of ten key result areas that include: Sustainable Economic Growth, Sustainable Environment and Enhanced Well-being and Social Responsibility. Ministries, departments, and districts are expected to implement sub-sector goals related to Economic, Environment, Security and Administration. The RERE project has been integrated into the Government’s National Development Plans 9 and 10 and has attracted both GoB and other partner funds (Swedish and Japanese).

The UN and Government of Botswana have articulated an UNDAF that responds to the National Development Plan with goals and outcomes in five areas: Governance and Human Rights Promotion; Economic Diversification and Poverty Reduction; Health and HIV and AIDS; Environment and Climate Change; and Children, Youth and Women Empowerment. The UNDAF will be implemented through a Joint UN Programme of Operational Plan.

A Government of Botswana/UNDP Botswana/UNDP/UNEP-Poverty Environment Initiative Joint Programme on Poverty and Environment plan to achieve the objectives articulated in the UNDAF (2010-2016) and related UNPOP (2010-2014) and UNDP Country Programme (2010-2014) is awaiting signature.

Gender issues were not taken explicitly taken into account in project design and implementation so far, however, with the project support, Energia has developed an action plan to incorporate the inclusion of gender aspects in the RERE project (grid and off-grid) by:

1. Increased connection rates and access levels by men and women to the grid and off-grid in rural areas;
2. Increased women's income generating opportunities;
3. Increased women participation in energy decision making and energy management.
4. Increased understanding of the different energy needs of men and women.

The Action Plan has been presented to the PSC and its implementation is pending.

### Sustainability (\*)

#### Overall Rating: Moderately Unlikely

As required by the GEF M&E Policy and GEF Guidelines, the sustainability of the RERE project was assessed "the likelihood of sustainability of outcomes at project termination, and provide a rating for this".<sup>5</sup>

Sustainability in this context is generally considered to be the likelihood of continued benefits after the GEF project ends. Consequently the assessment of sustainability considers the risks that are likely to affect the continuation of project outcomes. The GEF Guidelines establish four areas for considering risks to sustainability. Each is separately evaluated and then rated on the likelihood and extent that risks will impede sustainability.

#### The following project sustainability rating scale was used:

- **Likely (L):** negligible risks to sustainability, with key outcomes expected to continue into the foreseeable future.
- **Moderately Likely (ML):** moderate risks, but expectations that at least some outcomes will be sustained
- **Moderately Unlikely (MU):** substantial risk that key outcomes will not carry on after project closure, although some outputs and activities should carry on.
- **Unlikely (U):** severe risk that project outcomes as well as key outputs will not be sustained.
- **Highly Unlikely (HU):** expectation that **few** if any outputs or activities will continue after project closure.
- **Not Applicable (N/A)**
- **Unable to Assess (U/A)**

1. **Financial risks (Moderately Unlikely):** The financial risks that may jeopardize the sustainability of project outcomes if the Government does not meet its commitment related to further future cash injections into BPC Lesedi. BPC Lesedi's primary income is from the connecting and monthly fees from the consumers who have solar systems installed in their homes. It would take several thousand

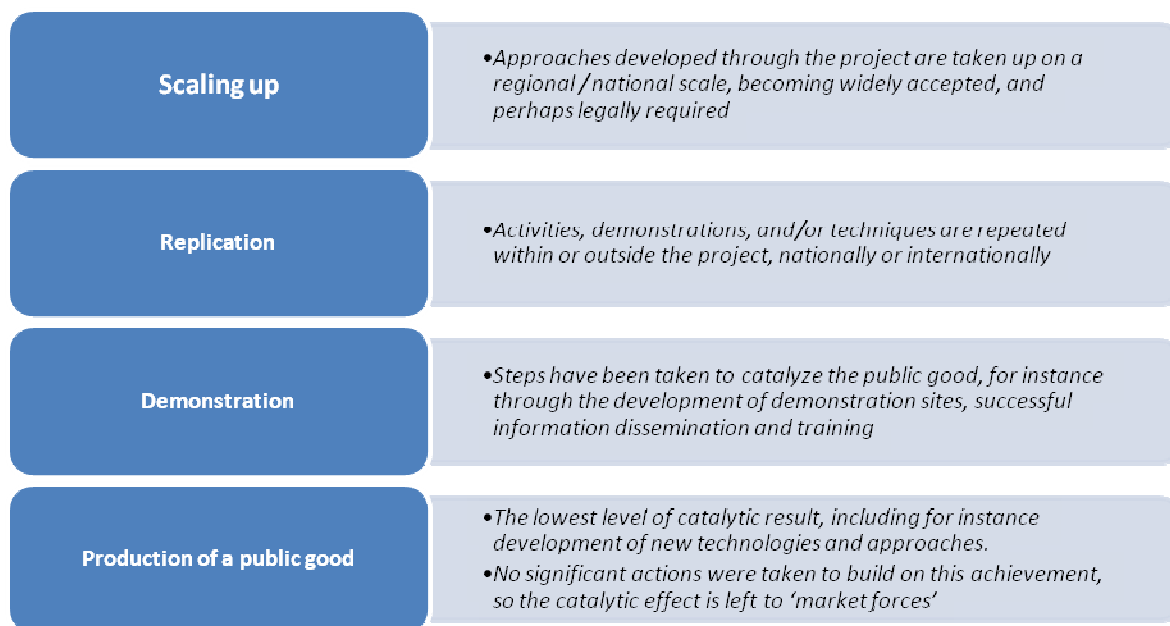
<sup>5</sup> Guidelines for GEF Agencies in Conducting Terminal Evaluations, 3.3 para. 19, pg.9-10

such installations expected to take 2 to 3 years before BPC Lesedi can fully stand on its own feet. There is only moderate likelihood that the financial and economic resources may not be available once GEF assistance ends and this can happen if the Government puts all its resources for grid-connection and abandons renewable energy path.

2. **Socio-economic risks: (Moderately Unlikely)** There are no perceived social or political risks that may threaten the sustainability of project outcomes. Some social stigma is still attached to the use of solar PV as people think it is for those to whom the government has given a low priority for grid connection. This should be changed through awareness and perception changing programs. The level of stakeholder ownership (including ownership by governments and other key stakeholders) is not fully sufficient as exemplified by part time nature of its project staff particularly from BPC to allow for the project outcomes/benefits to be sustained. However, the findings and recommendations of this terminal evaluation will help resolve these issues. Furthermore, the various key stakeholders unanimously see that it is in their interest that project benefits continue to flow. The public/stakeholder awareness is low in support of the project's long-term objectives but under the accelerate roll out of the awareness and sensitization program by BPC Lesedi, this risk is low.
3. **Institutional framework and governance risks (Moderately Unlikely):** A draft of Energy Policy has been developed since November 2010 and is awaiting update to satisfy Parliament's requirements. Reinforcement of renewable energy strategy will stem from the approval of the policy. The current governance structures and processes within the project have not been fully developed giving rise to ambiguous and conflicting roles between EAD, BPC, and BPC Lesedi. However, it is expected that the findings and recommendations of this terminal evaluation will help resolve these issues. Until then the project faces some risks that may jeopardize sustainability of project benefits. The project also needs to improve its requisite systems for accountability and transparency, and required technical know-how.
4. **Environmental risks: (Moderately Likely):** There are no ongoing project activities that may pose an environmental threat to the sustainability of project outcomes. There is no issue with land use as all PV systems are installed in owner's property with no significant footprint. There is very little or no human safety related hazards for the end-users. On the contrary the use of PV electrification and efficient woodstoves will help reduce cutting down of trees, less use of paraffin and thus improve the indoor air quality and human health. Some risk may exist if the standards on PV battery recycling or disposal are not followed. Risk related to disposal and waste management of CFL bulbs that BPC Lesedi is promoting also needs to be managed.

### **Catalytic Role**

No significant progress has been made in terms of the RERE project playing a catalytic role. The GEF Guidelines recommend that the evaluator should consider the extent to which the project has demonstrated: a) production of a public good, b) demonstration, c) replication, and d) scaling up.



Replication is likely to be achieved after franchises in all the six regions of the country will become fully operational. Replication can have two aspects, replication proper (lessons and experiences are replicated in different geographic area) or scaling up (lessons and experiences are replicated within the same geographic area but funded by other sources). Examples of replication approaches include:

- Knowledge transfer (i.e., dissemination of lessons through project result documents, training workshops, information exchange, a national and regional forum, etc).
- Expansion of demonstration projects.
- Capacity building and training of individuals, and institutions to expand the project's achievements in the country or other regions.
- Use of project-trained individuals, institutions or companies to replicate the project's outcomes in other regions.

Replication is likely to be achieved after franchises in all the six regions of the country will become fully operational.

### **Impact**

Due to low project achievement and lack of data in M&E, it is not possible to evaluate the impact of the project as recommended in the GEF Guidelines which is discussed below. Field interviews revealed that PV systems installed so far are used to replace kerosene lighting which is contributing to reduced GHG emissions and will improve better health in terms of less respiratory diseases in the long term. However, it is not possible to quantify it at this stage of the project.

No PV demonstration systems have been installed in the rural areas by the project to enable the availability of health service during night time maternity health being the major beneficiary. The RERE project so far has concentrated on SHS for individual households only.

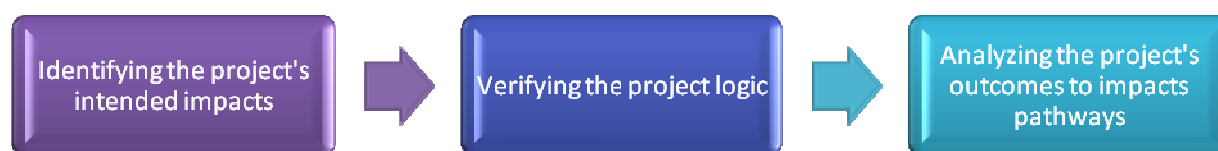
The field visits did not indicate any significant use of PV for productive uses demonstrating a new window for income generation in rural areas. Only one house was making its system to its neighbor for charging cell phones at a cost of 5 Pula, and another consumer using his system to chill beers for sale.

As the UNDP portfolio matures, it is increasingly relevant to discuss the extent to which projects are achieving impacts or are progressing towards the achievement of impacts. The key findings that should be brought out in the evaluations include whether the project has demonstrated:

- verifiable improvements in ecological status
- verifiable reductions in stress on ecological systems
- through specified process indicators, that progress is being made towards achievement of stress reduction and/or ecological improvement. For example, if as a result of the project, there have been regulatory and policy changes at regional, national and/or local levels

This analysis requires the availability of verifiable data on pollution reduction and ecological status improvement, and/or the existence of process indicators that suggest such impacts should occur in the future as a result of project achievements. If the project is a foundation setting effort, it is not anticipated that stress reduction and/or status change impacts will be achieved in the short to medium term.

As part of the GEF 4th Overall Performance Review (2009) the GEF EO developed and published a Handbook on the Review of Outcomes to Impacts (RoTI).<sup>6</sup> The Handbook sets out a methodology for gauging the likelihood of impacts at project closure. The methodology uses a Theory of Change approach to evaluate the overall performance of GEF projects. The methodology features three main stages:



The RoTI methodology is not required for evaluations of UNDP projects financed by the GEF; however for some projects it may be useful, especially for demonstration and investment projects where substantial stress and/or status change impacts are anticipated.

<sup>6</sup> [OPS4-M2-ROTI Handbook | Global Environment Facility](#)

## 4. Conclusions, Recommendations & Lessons Learned

### 4.1 Conclusions

Below are major conclusions drawn from evaluation of the project.

#### *Project Formulation and Implementation*

The project objectives and components as stated in the GEF project document (2005) were clear and achievable in the five years (2006-2010) allocated to the project. The assumptions and risks articulated in the document were also appropriate. There were two changes in the design of the project at its inception. One was a major change that had to do with the financing model for the solar PV equipment. The original project design included an 80% subsidy by the GOB towards the end-users purchase of the equipment. This approach was dropped based on the successful experience gained from the JICA pilot program which was based on fee-for service model. Another change had to do with dropping of the sale of LPG in lieu of promoting efficient wood fuel stoves. In hindsight both these changes were judicious. Fee-for-service is enabling the use of the solar PV more affordable for the consumers as they do not need significant capital that would have been required in purchase even with the government subsidy. Fee-for-service also puts the burden of service on the service provider covered as part of the monthly fees paid by the consumers. Franchisee's presence in the field and in proximity of the consumers results in more rapid response to maintenance and repairs. LPG was dropped because it was discovered that this industry is already private sector driven and efficient. On the other hand, promotion of efficient wood fuel stoves would reduce the felling of trees by rural population as most of the cooking is still done on charcoal or wood stoves.

While the capacities of the Executing Agency (EAD) and the Implementing Agency (BPC) at the inception of the project were weak, recruitment of the international staff (Chief Technical Advisor, Business Development Manager (BDM) and Technical Officers (TO) for BPC) filled in the right skills, though the recruitment process itself took a long time. However, these three experts stayed only a short time (2.75 years for the CTA and about 1 year for the BDM and TO) with the project and their vacant positions were not filled. There was considerable backstopping support also by the UNDP JPO who also left mid way through the project. Since then this project has faced a series of recurring and systematic challenges. The project has witnessed poor implementation and operational delays e.g. low-quality project management, irregular reporting, inadequate project oversight and failure to meet targeted financial disbursements. It is only in the past few months in 2011 and in the final implementation year 2010, that the project has picked up the momentum to achieving progress on key outcome related to the actual installation of the solar home systems and other renewable energy appliances at the household level.

The project has spent less than 40% of the allocated GEF budget. Over the past year the UNDP CO have and also previously in the exception report in 2008, without much success made a number of efforts to make project stakeholders aware of the seriousness of the situation and the need to address the major shortcomings of the project. Likewise only 50% of the Government (co-financing) budget has been used for the project.

The level of commitment from the Executing Agency (EAD) and the Implementing Agency (BPC), to the project has thus far been poor which the UNDP CO has conveyed this to the highest levels (i.e. ministerial level). Over the past several years the focus of BPC has been on grid-extension and off grid PV connections have had a low profile within BPC, which partially explains why the project has been afforded so little

attention within BPC. The evaluation indicates that BPC project staff did not have the capacity to properly manage the project given other competing responsibilities.

Part of the failure of the project is attributed to lack of supervision and oversight of the project by UNDP CO and for not carrying out a Mid-Term Evaluation.

### ***Project Results***

On a positive note, the RERE Projects has contributed to the overall outcome of Climate Change Mitigation and Adaptation in Botswana through the increase in awareness at both users and policy-makers on cleaner energy services, wood-efficient cooking stoves and hot bags. The two latter products have also contributed to the cross-cutting UNDP development objectives of Gender Empowerment and South-South Cooperation. Cooking and heating are the most neglected in many energy projects making women the least of the beneficiaries. The RERE project has addressed a wide range of household energy needs that would cover needs of both men and women in households through a package of energy services comprising of solar home systems, lanterns, wood-efficient stoves and hot-bags.

However, there is a huge gap between the results to date for **Outcome 1** (less than 18% on installation of Solar Home Systems and less than 10% in the sales of rechargeable lanterns and efficient cooking stoves) compared to the original targets regarding the number of consumers using PV-based lighting and cooking systems and home solar electric systems at the end of the project.

The installation of the mini-grid PV system has also been delayed significantly; the pre-feasibility was completed just recently with the system design underway which would then be followed by tendering. The mini-grid PV is not expected to become operational until 2012.

Progress on **Outcome 2** related to finalization of the Energy Sector policy has also not been achieved fully. The policy remains at the draft stage since November 2010, awaiting recruitment of a second consultant by EAD to update the policy to satisfy requirements of the Parliament. Gender mainstreaming plan also took a long time to complete and has yet to be implemented. The PV standards supposedly developed by the Botswana Bureau of Standards (BOBs) are not visible or in use by PV vendors and certainly no enforcement mechanism exists.

**Outcome 3** related to awareness building and perception changing has seen some positive results through a series of mass media, trade fares, briefings to the councilors in 2007/2008 but not much recent activities as indicated by documents in the Outbox. This is attributed to lack of coordination between EAD, BPC and BPC Lesedi staff having similar responsibility related to consumer awareness, though for different layers of public (i.e., from consumers to local government to senior government officials). A clear communication strategy articulating both short and long-term actions including definition of the roles and responsibilities of EAD, BPC and BPC Lesedi needs to be developed. Modest marketing and advertising by BPC-Lesedi is leading to very marginal demand on the products. Project seems to be working as a stand-alone with great reluctance for coordination with other projects and other initiatives. Solar advocacy has benefitted minimally from the project due to lack of a dedicated officer on Communications and Advocacy. This lesson is being reversed in two of the GOB-UNDP projects currently running, namely; (i) Integrated Water Resources Management and (ii) Poverty & Environment Initiative.



**Outcome 4** related to public-private sector strengthening also needs to be strengthened. Some private sector PV technicians and franchisees have been trained in PV technology, some franchisees have or about to take further training and also training in business development skills. However, a more systematic training plan needs to be developed to compliment the skills required for BPC Lesedi's field installation and maintenance. The PV technicians should be certified by an appropriate governmental agency. It was learned that majority of the PV technicians used are electrical engineers who have had hands on training on the job for installing PV equipment. A reputable PV vendor expressed his fear that some of these installations may be below the industry standards. As no national standards are in place or being enforced, replication of current programs may show high rate of future system failures. Regarding the training, BPC Lesedi indicated that the performance has not been very satisfactory and this is exasperated by the project office. Training requests are turned down by the office even before they reach the UNDP. Delays in arranging payment of travel allowances and providers. The UNDP has to this day not given answer as to whether the long request training of trainers for franchising will ever happen. This is a very important element of the franchise approach adopted. Necessity for training should be determined at operations by the supervisors of staff to be trained not by not funders.

**Outcome 5** related to financing is also developing slowly. Franchising packages have been completed and two out of 4 identified franchisees have signed the agreement. Negotiations are still ongoing with the Bank Gaborone on extending credit facility to potential franchisees and customers from the revolving funds to be set up by BPC Lesedi. Lack of capital may make it difficult for the franchisee to scale up their programs. GOB injected 7 Million Pula into the BPC Lesedi cash flow which took a long time for it to be approved. Similar delays for the next expected injection of 10 million Pula may result BPC Lesedi to experience cash flow problems forcing them to take greater debt by borrowing from a commercial bank. Until BPC Lesedi's sales through franchisees reach a volume of several thousands, its revenue may not be sufficient for it to stand on its own feet as is expected of it as a private entity.

Most of the activities under **Outcome 6** related to replication and sustainability have yet to be initiated.

*Stakeholder* participation the project in the implementation and decision making is vital to a broad buy-in into the project. It was noticed that several line ministries and other governmental agencies; representatives of private sector, non-governmental and community-based organizations, and particularly women's groups are not participating in the project. They seem to have participated well during the development of the GEF Project Document in 2005.

### ***Monitoring and Evaluation***

Monitoring & Evaluation is also weak and does not use the revised log frame matrix that was improved first in 2008 and then in early 2010 based on the Smart approach. The project is awaiting the purchase of web-based software for ***Impacts Assessment and Monitoring***, whose procurement has been delayed significantly. Review of the various reports generated by the project indicates that the M&E was more process driven and based on the items discussed in the PSC, Working Group Meetings etc. The minutes of the meetings show that tracking on activities is on ad-hoc basis. Request for project budget and expenditure from BPC resulted in figures particularly the remaining balance of GEF-UNDP fund could not be reconciled with the figures provided by UNDP based on its ATLAS data. No explanation was provided by the Project Manager. BPC figure is lower than the UNDP figure by over USD300,000.

Nevertheless the attractiveness of solar PV for rural energy provision has increased substantially over the past several years in developing countries and the project remains the best practical leverage the UNDP CO has to engage with the GOB on renewable energy issues. The evaluation consultant is of the opinion that UNDP CO appears to be in support of granting of an extension to the project to allow for the fruition of what represents a strategic intervention for meeting energy needs of the very poor and remote communities in a gender-focused manner with minimal GHG emissions.

The Project Manager admitted that he was completely overwhelmed by other responsibilities and that he was able to give less than 40% of his time to managing the project. He agreed that the project set-up of not having a full-time project manager was in hindsight a major contributing factor to the project's poor performance thus far. He acknowledged that the management and implementation of the project was seriously flawed from the outset and that he should have taken corrective steps to address the situation much earlier. It was quite obvious during the interviews that it was not a high priority for him given his other duties.

On a more positive note, meetings with senior BPC staff and one Board member of BPC Lesedi pointed to a real accomplishment for the project, namely the formal establishment of BPC-Lesedi during the past year and the official launch of one of its franchising field office in April 2011. This is a very important development that bodes well for the future development of the solar PV market in Botswana. BPC-Lesedi has now been established as a legal subsidiary of BPC with the French Utility company EDF joining as a minority investor and strategic partner. In October 2009 a GM was appointed to head BPC-Lesedi, which has a specific mandate to provide basic energy services to rural communities in Botswana that are not able to access the grid. BPC Lesedi received first 5 Million Pula followed by 7 Million Pula from the BPC. EDF injected USD585,000 as their 45% equity share into BPC Lesedi. The company has a ten year business plan and a target of installing 3,000 RE systems in the next couple years based on a fee-for-service model. BPC-Lesedi's product range includes has rechargeable lanterns, efficient wood stoves, hot bags and 80 Wp to 240 Wp home solar PV systems. BPC-Lesedi regional offices are now being set-up in various parts of the country. The marketing materials they have developed are professional and attractive and EDF brings a strong track record as a minority partner. It can be expected that with the launch of BPC-Lesedi and given their targets for numbers of system installed within the next couple years, irrespective of whether the project continues or not the project targets with respect to Outcome 1 have a good likelihood of being achieved after project closure.

The GM of BPC Lesedi revealed an optimistic outlook on the future of renewables in Botswana. However in the interview with him, he expressed his strong dissatisfaction with the management and pace of project thus far. According to him, management and finance staff at BPC were extremely slow in approving project payments and out-of-touch with the reality on the ground. While BPC management was reluctant to acknowledge the project's operational weaknesses, the BPC-Lesedi CEO was unequivocal in stating that the original set-up was flawed and that the project needs its own dedicated project staff to implement project activities on a timely basis. It was quite interesting to note the different points of view on project implementation and the need for corrective actions (often expressed in candid terms) between staff of BPC (the parent and current project host) and BPC-Lesedi (the new subsidiary with a clear commercial mandate). BPC-Lesedi expressed their support for a project extension conditional upon a new operational management structure being in place and the new project work plan being revised to conform to the activities in BPC-Lesedi's business plan.

While BPC-Lesedi seems well-positioned to reap the benefits of much of the policy and awareness-building activities that the project has helped support since its inception, there nonetheless remain a number of important challenges they will need to overcome to successfully meet their financial targets. One issue that hampers the uptake of solar PV by consumers and the ability of BPC-Lesedi to attract customers is general belief among many rural communities in Botswana that the extension of the grid will come to their communities and thus there is no need for them to invest in solar PV. This has been exacerbated by the lack of a clear policy directive from government in this regard. While the government has made plans to electrify certain parts of the country, it is clear from BPC that funds are limited and it is not realistic to expect that many parts of the country will be electrified by the grid in the next 10-20 years. Off-grid renewables are thus the short and medium-term option in those areas. However the government has not yet made clear their official position with regards to the promotion of off-grid energy options and no subsidy scheme is in place. Many communities continue to “wait for the grid” even as BPC itself acknowledges that areas with low load density will not be connected anytime soon and should look to BPC-Lesedi as their first choice for energy services. In this regard, the awareness and perception changing programs by BPC Lesedi are very important.

The project has made some important progress this past year on the policy front and RE activities are now integrated into National Development Planning (NDP 10) frameworks.

It is clear that the implementation set-up for the project with no dedicated staff and a part-time Project Manager has been a failure. The issue of the implementation structure was brought up in the various PSC meetings (as recorded in the Exception Reports of 2007 and 2008) and assurances were given to increase the project support. There were also repeated attempts by the UNDP CO as exemplified in the 2008 Exception Report to get to the bottom of this issue, .

### ***Project Rating***

The project was given a **Marginally Unsatisfactory** rating for **Development Objective** and **Unsatisfactory** rating in the 2010 PIR for Implementation by the UNDP Regional Technical Adviser (RTA) for the project. The UNDP CO Project Manager gave **Marginally Unsatisfactory** rating to both components in the 2010 PIR. The evaluation consultant gives a rating of **Unsatisfactory** to both components.

The evaluation consultant in his meetings with the key government and project stakeholders received a strong expression of their overall commitment to the project and desire to see the project extended. However there was general consensus that the current “business as usual” modality under which the project was being managed had been a failure and any extension was predicated on the development of a new operational and management structure. An internal UNDP memo indicates that a number of structural changes to the current implementation arrangement were supposed to be discussed and proposed with projects stakeholders, all of which were to be tabled for discussion at the previous PSC meeting scheduled last year. The valuation consultant did not find any progress on this front.

## **4.2 Recommendations**

### **General**

Based on the key findings from the evaluation, it appears that with a 2 year extension and a reconstituted project structure and dedicated staffing, revised work plan integrating BPC-Lesedi detailed action plan, the

project could make up for a great deal of lost time and show positive results. However these actions should be carried out within the next two to three months time.

### **For the Project Implementing Unit**

- Discuss and agree on a project structure and roles and responsibilities of the individuals. A project Organogram should be developed. This should reflect BPC Lesedi's action plan and interaction between EAD, BPC, BPC Lesedi and UNDP. Appropriate staffing particularly the Project Manager should be dedicated on a full time basis.
- The Stakeholders plan in the original Project Document should be reviewed and the engagement with the agencies that have thus far been inactive (e.g. governmental agencies, private sector, non-governmental and community based organizations including women's groups) should be strengthened.
- The GEF National Focal Point who has not been involved so far should also be invited to participate in the project.
- The strengths, weaknesses, opportunities and threats (SWOT) analysis of the project should be developed using an independent consultant and he/she should ascertain what changes would be needed to the project set-up as a condition to a possible extension.
- Review the current Log Frame Matrix and revise it to suit the new structure made up of EAD, BPC and BPC Lesedi.
- The awareness and perception changing by the project needs to be strengthened. A systematic strategy and plan on awareness building aimed at the different layers of the public (consumers, local government and central government) needs to be developed. The Communications Strategy under development by EAD should be expedited and should define the role and responsibilities of the various project stakeholders.
- There is currently no external financing modality for the franchises and end-users. The ongoing negotiations with Bank Gaborone should be concluded soon to avail funds to these parties. Other credit lending agencies should also be approached including local micro credit organizations.
- The Gender Action Plan developed by Energia should be integrated into the project work plans.
- BPC Lesedi in collaboration with EAD and BPC should carry out a consumer survey to assess the current needs and satisfaction on the use of PV technology thus far.
- A database should be established for the key indicators to be tracked in the M&E.
- Project should develop a Strategy on Replication and Sustainability (Component 6).
- To improve the sustainability of project outcomes, develop and implement a sustainability strategy and establish financial and economic instruments and mechanisms to ensure the ongoing flow of benefits once the GEF assistance ends.

### **For BPC Lesedi**

- Expedite negotiations with Bank Gaborone on credit schemes for the end-users and franchisees.

- Establish better coordination and flow of information with the Executing and Implementing Agencies noting the private sector nature of BPC Lesdedi but also in light of the Government’s stake in the project. In this regard, the plans for awareness campaigns, marketing strategy, monthly progress reports, and training programs for franchisees should be shared with EAD, BPC and UNDP.
- Initiate and maintain a consumer needs and satisfaction survey.
- Expand the delivery of solar PV systems to institutions such as hospital clinics, schools and others for income generation. This may include provision of solar water pumps, solar crop dryers, etc.
- Exercise greater diligence in selecting franchisees to balance between “who will potentially make a good franchisee” versus “who will be a better business man/woman”.

#### **For the Government of Botswana**

- Renew and increase its commitment to the project
- Create a level playing field for renewable energy by removing fiscal and market barriers – removal of custom duty & VAT
- Expedite the development of the Energy Sector Policy and initiate the development of a Renewable Energy Strategy
- Take the necessary and immediate measures to ensure that standards on PV are approved and enforced through consumer awareness and inspection and control at ports and entry borders.
- Implement the PV code of practice to ensure good systems functionality. An appropriate body should be given the role in the certification of PV installers and informing the public through awareness campaigns and the media.

#### **For UNDP**

- Consider approving BPC’s December 2010 request for a project extension by two years subject to the project accepting the above recommendations
- Invest more in its oversight role of the project
- Agree on an arrangement with GOB to revise the work plan and associated budget to grant a two-year extension to the Project.
- Seek GOB’s assurance of its earlier financial commitments to the project as well as to BPC Lesedi

### **4.3 Lessons Learned**

- The main lesson learned from this project is that a strong commitment by the government, Executing and Implementing Agencies is very vital for the success of the project.
- Rural policies and planning related to renewable energy can have major influence on the project outcomes and sustainability and must be explicitly addressed in project design and implementation.
- Institutional arrangement for project implementation can greatly influence the value of the project in terms of demonstrating viable business models and thus achieving sustainability.

- While there is a high demand for solar PV systems in Botswana for solar home systems, there is also a high potential for PV use for productive and income generating uses which needs to be explored further.
- To address the needs of rural electrification Botswana, a proper segmentation along income lines, needs, and lifestyle are necessary. IFC (Selling Solar, 2007) has shown that the definition of affordability varies among market segments (relative income levels, market applications, etc.), and it remains a challenge for PV companies to identify the niche market segments where solar PV is the least-cost energy alternative for the consumer. It was observed in the field that for the RERE project, some consumers find the largest system (3 panel-240 Wp) costing monthly fee of 270 Pula affordable, while others can hardly afford the lowest system (1 panel-80 Wp) at 70 Pula just barely affordable.
- IFC experience (Selling Solar, 2007) has also demonstrated that people are looking for a constant supply of electricity provided by grid connection. It is important to note that, while solar PV is cheaper for governments than costly grid expansion in dispersed rural populations, grid connection has emerged as a key political tool in many developing countries, and the grid has almost always been heavily subsidized. In addition, solar PV simply cannot provide equivalent services to the grid, and it is also not the only technology available for addressing rural electrification demand. The high initial cost of acquiring a solar PV system makes solar PV considerably less affordable to the rural poor than alternatives, such as car batteries and kerosene.
- Establishing a reasonable equipment standards and certification procedure for solar home systems can ensure quality service while maintain affordability.
- While BPC Lesedi is making commendable effort in demonstrating to the financing sector that PV is a financially viable business, this activity remains a challenging issue which needs more efforts to sustain, especially when it comes to financing for the end-users and franchisees.
- Projects in rural areas must recognize high transaction costs associated with marketing, servicing and credit or fee collection.
- The fee-for-service system adopted by the project shows opportunities to combine subsidies and market operation. However, the experience with the fee-for-service system is still limited. The main challenge for this model is to organize operation and maintenance of the systems and fee-collection in a financially sustainable way, such that user contribution covers the costs for the franchisee. This has not yet been demonstrated.
- The Logical Framework Matrix forms the basis for sequencing of program activities, and for M&E. Project Management staff should make full use of this tool, and when needed staff should be trained in its use. Lack of adequate M&E leads not only to sub-optimal achievement of project outcomes, but also fails to provide the necessary feedback for the project to be responsive to changes in its environment.

# Annexes

## Annex 1: ToR - RE-Botswana Terminal Evaluation.



### *Terms of Reference*

#### *Evaluation of the Renewable Energy-based Rural Electrification Project*

##### 1. Introduction

###### a) UNDP/GEF Monitoring and Evaluation (M&E) Policy

The Monitoring and Evaluation (M&E) policy at the project level in UNDP/GEF has four objectives: i) to monitor and evaluate results and impacts; ii) to provide a basis for decision making on necessary amendments and improvements; iii) to promote accountability for resource use; and iii) to document, provide feedback on, and disseminate lessons learned. A mix of tools is used to ensure effective project M&E. These might be applied continuously throughout the lifetime of the project – e.g. periodic monitoring of indicators or as specific time-bound exercises such as mid-term reviews, audit reports and final evaluations.

In accordance with UNDP/GEF M&E policies and procedures, all regular and medium-sized projects supported by the GEF should undergo a final evaluation upon completion of implementation. A final evaluation of a GEF-funded project (or previous phase) is required before a concept proposal for additional funding (or subsequent phases of the same project) can be considered for inclusion in a GEF work program. However, a final evaluation is not an appraisal of the follow-up phase.

Final evaluations are intended to assess the relevance, performance and success of the project. It looks at early signs of potential impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. It

will also identify and document lessons learned and make recommendations that might improve design and implementation of other UNDP/GEF projects.

#### b) The Project Objectives and Context Within the Country Programme

The Renewable Energy-based Rural Electrification project aims at supporting national efforts to reduce Botswana's energy-related CO<sub>2</sub> emissions by promoting renewable and low GHG technologies as a substitute for fossil fuel (fuel wood, paraffin and coal) utilized in rural areas. The activities proposed in the project are designed to contribute to the removal of barriers to the wide-scale utilization of renewable energy and low GHG technologies to meet the basic electricity needs of individual households in terms of lighting, power for radiocassette/TV and income-generating activities. In turn, this project will contribute to the initiation of the intended renewable energy programme of the Government of Botswana and to encourage the development of the private sector industry in the provision of renewable energy in the country.

The renewable energy resource situation that has been assessed during the implementation of the PDF B phase confirms that solar energy is available in abundant quantities, more or less equally distributed over the country throughout the year. Other renewable energy sources such as wind are limited, location specific and unevenly distributed during the year. Biomass energy is one of the main renewable energy sources currently being used in Botswana for cooking and heating. However, available biomass resources (both woody biomass and agricultural residues) are insufficient to generate and distribute electricity on a sustainable basis. As a result, the main focus for making use of renewable energy resources in Botswana will be on solar energy to be used with various PV-based electricity generation technologies; i.e., mobile solar systems, solar home systems, battery charging stations and mini -grids.

The Energy Master Plan proposes access to electricity through connection to the national grid, off -grid connection or PV to all those households where it makes economic and social sense, and improving the affordability of electricity to households. It also identified the following factors:

- Electrification planning should be integrated with other development planning; and
- Rural electrification should be regarded as part of the national electrification programme, albeit with different objectives and requirements to urban electrification.

With regard to renewable energy-based electrification, the Energy Master Plan states that PV electrification should be part of national electrification planning. Planning of PV electrification needs to take cognizance of grid expansion plans, and should be funded under the same principle that justifies grid rural electrification. Rural electrification has been an important component of the national development agenda for Botswana. However, the high cost of rural grid electrification programmes have been a barrier, with the result that approximately 17% of the total rural population has access to grid electricity services, compared to 36% in the urban areas. There are several previous / ongoing studies conducted in respect of PV. These include the JICA Master Plan Study on Photovoltaic Rural Electrification (MPS). The MPS was designed to formulate a master plan for the promotion of rural electrification in Botswana by using PV systems over a ten -year period, starting in 2003. The outcomes of the MPS have been largely used for the preparation of the UNDP -GEF supported Renewable Energy Based Rural Electrification Programme and furthermore it forms the basis for the same.



The objectives of the MPS were to:

- Supply solar electricity, quickly and under affordable conditions, to households in rural areas that cannot benefit from grid electrification and other energy supply services;
- Implement the PV rural electrification project at the least cost practicable and in a financially feasible and sustainable manner;
- Integrate with infrastructure projects required for a specific region or area; and
- Expand environmentally friendly energy use.

Other prior initiatives on renewable energy-based rural electrification are:

- Botswana Renewable Energy Technology Project;
- Manyana PV Project;
- National PV Rural Electrification Programme;
- Motshegaletau Centralized PV System; and
- Global Environment Facility - Small Grants Programme (GEF-SGP) Solar Lantern Project.

The project commenced in 2005 and was to run for five years, with a planned date of 31<sup>st</sup> December 2010, under the execution of the Energy Affairs Department (EAD) in the Ministry of Minerals, Energy and Water Resources (MMEWR). The Ministry of Environment, Wildlife and National Parks (MEWT) through the National Climate Change Committee (NCCC) were instrumental in developing the concept. A larger programme of government was also being initiated for a long-term roll-out of renewable energy-based services in rural areas. This programme of government is currently funded through the Botswana Power Corporation (BPC) – the national power utility corporation. An agreement was signed between BPC and EAD in October 2006 to facilitate the implementation of the programme. BPC was then considered the de facto executing agency for the RERE project. A project manager was appointed by BPC in December 2005.

A Project Steering Committee (PSC) serves as a body for policy recommendations related to enhancement of programme implementation and attainment of objectives. The PSC comprised on members as recommended in the Project Document.

Further details on the partners, resources and geographical context are available in the Project Document at [www.unbotswana.org.bw](http://www.unbotswana.org.bw).

## 2. Objectives of the Evaluation

The evaluation of the RERE project is commissioned by the Government of Botswana's Ministry of Minerals, Energy and Water Resources, Botswana Power Corporation, UNDP-Botswana and the GEF in accordance with the project's M&E Plan. It is intended to assess the performance of the project against planned results. The results of the evaluation will also inform the partners in the project, i.e. the Government of Botswana, Botswana Power Corporation, Global

Environment Facility and the United Nations Development Programme on the need for any extension of the project duration. If extension is indicated beyond the original five years, whether the project has a chance to deliver the agreed outputs, how sustainable the outputs are and what changes need to be effected..

Further thereto, the renewable energy represents part of the new United Nations Programme and United Nations Operational Plan (UN-POP) for the period 2010-2014 wherein climate change mitigation and developing of a low-carbon economy in a developing country of extensive coal reserves are challenging development and environmental issues. The RERE project evaluation will therefore inform subsequent activities outlined in the United Nations Development Assistance Framework (UNDAF) and United Nations Programme Operational Plan (UN-POP). The evaluation will also inform stakeholders on the achievements of the RERE project in promoting the use of renewable energy and reducing carbon-related emissions in Botswana.

### 3. Products Expected from the Evaluation

The key evaluation products the evaluation team will be accountable for producing are:

**Evaluation inception report**— An inception report should be prepared by the evaluators before going into the full fledged evaluation exercise. It should detail the evaluators' understanding of what is being evaluated and why, showing how each evaluation question will be answered by way of: proposed methods; proposed sources of data; and data collection procedures. The inception report should include a proposed schedule of tasks, activities and deliverables, designating a team member with the lead responsibility for each task or product. The inception report provides the programme unit and the evaluators with an opportunity to verify that they share the same understanding about the evaluation and clarify any misunderstanding at the outset.

**Draft evaluation report**— The programme unit and key stakeholders in the evaluation should review the draft evaluation report to ensure that the evaluation meets the required quality criteria.

**Final evaluation report.**

**Evaluation brief and other knowledge products** or participation in knowledge sharing events, as appropriate.

The following structure is proposed for the Evaluation Report:

1. Executive summary
2. Introduction
3. The project(s) and its development context
4. Findings and Conclusions
  - 4.1 Project formulation
  - 4.2 Implementation
  - 4.3 Results
5. Recommendations
6. Lessons learned
7. Annexes

The report is not to exceed 50 pages in total. The evaluation will last for 6 weeks and the final report to be concluded within 1 week of completion of the in-country part of the mission and sent to UNDP-Botswana. As part of the evaluation the consultant is expected to consult with a broad range of stakeholders within government, private sector, civil society organization, media, academia and local communities. If there are discrepancies between the impressions and findings of the evaluation team and the aforementioned parties these should be explained in an annex attached to the final report.

### 3. Methodology and Evaluation Approach

The methodology includes review of (i) background project governance documents (Project Steering Committee meeting minutes, Project exception reports, project progress reports, project audit reports, project issues log, project risks log and project communications log), (ii) project results documents (consultancy reports, mission reports, commentary by partners, etc), and (iii) project document, its logical framework analysis and Results matrix.

A review of partners and appreciation of their linkage and interest in the project and the relevance of the project to their current situation is essential. The evaluation is expected to obtain the views of both the project implementing parties, the project governance structure and the project beneficiaries. The final decisions about the specific design and methods for the evaluation will be concluded at inception.

The evaluation will also reflect on whether and how monitoring and evaluation were considered in the project design and undertaken during implementation

In addition to a descriptive assessment, all criteria marked with (R) should be rated using the following divisions of the six-point rating scale: Highly Satisfactory (HS), Satisfactory (S), Marginally Satisfactory (MS), Marginally Unsatisfactory (MU), Unsatisfactory (U), or Highly Unsatisfactory (HU).

The evaluation will cover all project activities from Inception to the time of evaluation; include all private sector, civil society and government entities involved in the project. Although the project had listed individuals as target, due to the duration and scale of the programme, the sampling will need to systematically select those individuals that have interacted most with the project. The Renewable Energy-based Rural Electrification project was aimed at removing a number a barriers to the wide-spread adoption of renewable energy – more specifically, solar PV. The barriers would be removed through field demonstration, public awareness and policy dialogue. These form the main elements of the intervention.

#### 4. Implementation Arrangements

The Evaluation is to generate the following information that will give intended users of the evaluation the information they seek in order to make decisions, take action or add to knowledge:

##### a) Management Arrangements

The role of UNDP-Botswana is to contract the consultant, oversee the implementation of the agreed schedule of consultation activities, wide stakeholder consultation and verification of all facts in the report and oversee the production of the final Report and follow-up actions.

The Country Office is the main operational point for the evaluation. It will be responsible for liaising with the project team to set up the stakeholder interviews, arrange the field visits, co-ordinate with the Government and ensure the timely provision of per diems and travel arrangements within the country for the evaluation team. These Terms of Reference follow the UNDP GEF policies and procedures, and together with the final agenda will be agreed upon by the UNDP/GEF/Regional Coordinating Unit, UNDP Country Office and the Government. These three parties will receive a draft of the final evaluation report and provide comments on it prior to its completion.

##### b) Time Frame

The evaluation will be undertaken in 20 working days commencing in the 3<sup>rd</sup> week of September up to the 3<sup>rd</sup> week of October 2010. The following table depicts tasks, timelines and deliverables, for which the consultant will be responsible and accountable, as well as those involving the commissioning office (UNDP-Botswana), indicating for each, who is responsible for its completion.

In addition, the evaluators are expected to support UNDP efforts in knowledge sharing and dissemination. Required formats for the inception reports, evaluation reports and other deliverables are included in the annexes of the ToR for the evaluation being commissioned. The consultant shall allocated 20 working days over a 30-day during which s/he will be engaged in the evaluation.

Table 1: Indicative Evaluation Work plan.

Task	Time Frame (weeks)				Responsible Entity
	1	2	3	4	
Desk review					Evaluation Team
Briefings of evaluators					UNDP Mgnt
Finalizing evaluation design & methods, and preparing detailed inception report					Evaluation Team
Reference Group Meets to Review Inception Report					UNDP PM
Field Visits & Interviews					UNDP PM
Analysis					Evaluation Team
Preparing the draft report					Evaluation Team
Stakeholder meeting and review of the draft report (for quality assurance)					UNDP PM
Incorporating comments and finalizing the evaluation report					Evaluation Team
Debriefing Session					Evaluation Team

## 5. Evaluation team composition and required competencies

The specific skills, competencies and characteristics needed in the evaluator or evaluation team specific to the evaluation and the expected structure and composition of the evaluation team, including roles and responsibilities of team members are outlined below:

### The Consultant

The consultant will be responsible for the final delivery of the evaluation report and

- Evaluation specialist with at least a Master in Development Studies, Business Management, Energy Management. or other relevant fields
- A minimum of ten (10) years of relevant work experience in the field of energy and/or environment.
- Proven expertise in evaluating multifaceted programmes/projects and results-oriented monitoring and evaluation.
- Previous experience in evaluating programmes/project for UNDP or other UN/multilateral agencies.
- Knowledge of international comparative policy, legislation and their application to deliver clean energy services in the field of energy and climate change will be a requirement distinctive advantage.
- Knowledge of the national policy and legislation in the field of energy and climate change will be a distinctive advantage.
- Excellent analytical and reporting skills and fluency in written and spoken English are essential.
- Demonstrated ability to assess complex situations in order to succinctly and clearly distil critical issues and draw forward-looking conclusions.

Evidence of previous relevant work will also be required in the form of resumes, work samples, references, etc. to support claims of knowledge, skills and experience. These ToRs demand that the evaluator be independent from any organizations that have been involved in designing, executing or advising any aspect of the intervention that is the subject of the evaluation.

## 6. Scope of the Evaluation

The scope of the evaluation for this project reflects the diverse range of activities as defined in the Log-Frame and Results Matrix. The Annex on the structure of the Evaluation Report outlines the content and depth of the analysis.

## 7. Evaluation ethics

The evaluation will be conducted in accordance with the principles outlined in the UNEG 'Ethical Guidelines for Evaluation' document, attached as Annex IV. The document outlines evaluation ethics and procedures to safeguard the rights and confidentiality of information providers. These include measures to ensure compliance with legal codes governing areas such as provisions to collect and report data, particularly interviewing or obtaining information about children and young people; provisions to store and maintain security of collected information; and protocols to ensure anonymity and confidentiality.

## 8. ToR annexes

- I. Norms for Evaluation in the UN System (<http://www.unevaluation.org/uneqnorms>)
- II. Standards for Evaluation in the UN System (<http://www.unevaluation.org/uneqstandards>)
- III. UNDP Evaluation Policy (<http://www.undp.org/eo/documents/Evaluation-Policy.pdf>)
- IV. UNEG Ethical Guidelines for Evaluation (<http://www.uneval.org/search/index.jsp?q=ethical+guidelines>)
- V. Code of Conduct for Evaluators in the UN System
- VI. Project Document
- VII. Format for Inception Report and Final Evaluation Report
- VIII. Terminology in GEF Guidelines to Terminal Evaluations ([http://www.undp.org/gef/05/documents/me/GEF\\_ME\\_Policies\\_and\\_Precedures\\_06.pdf](http://www.undp.org/gef/05/documents/me/GEF_ME_Policies_and_Precedures_06.pdf))

## Annex 2: Evaluation Criteria Matrix.

Evaluative Criteria	Questions	Indicators	Sources	Methodology
<p><b>Relevance:</b> How does the project relate to the main objectives of the UNFCCC and GEF focal areas, and to the environment and development priorities at the local, regional and national levels for <i>reducing Botswana's energy-related CO<sub>2</sub> emissions by promoting renewable and low GHG technologies as a substitute for fossil fuel (fuel wood, paraffin and coal) utilized in rural areas and the activities proposed in the project are designed to remove barriers to the wide-scale utilization of renewable energy and low GHG technologies to meet the basic electricity needs of individual households in terms of lighting, power for radio-cassette/TV and income-generating activities. And in turn, for the project to help with the initiation of the intended renewable energy program of the Government and to encourage the development of the private sector industry in the provision of renewable energy in the country.</i></p>				
Is the project relevant to UNFCCC and other international convention objectives?	<ul style="list-style-type: none"> <li>• How does the project support the objectives of the UNFCCC?</li> <li>• Does the project support other international conventions, such as the Carpathian Convention, and the UNFCCC?</li> </ul>	<ul style="list-style-type: none"> <li>• UNFCCC priorities and areas of work incorporated in project design</li> <li>• Level of implementation of UNFCCC in Botswana, and contribution of the project</li> <li>• Priorities and areas of work of other conventions incorporated in project design</li> <li>• Extent to which the project is actually implemented in line with incremental cost argument</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents</li> <li>• National policies and strategies to implement the UNFCCC, other international conventions, or related to environment more generally</li> <li>• UNFCCC and other international convention web sites</li> </ul>	<ul style="list-style-type: none"> <li>• Documents analyses</li> <li>• Interviews with project team, UNDP and other partners</li> </ul>
Is the project relevant the GEF climate change focal area?	<ul style="list-style-type: none"> <li>• How does the project support the GEF climate change focal area and strategic priorities</li> </ul>	<ul style="list-style-type: none"> <li>• Existence of a clear relationship between the project objectives and GEF climate change focal area</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents</li> <li>• GEF focal areas strategies and documents</li> </ul>	<ul style="list-style-type: none"> <li>• Documents analyses</li> <li>• GEF website</li> <li>• Interviews with UNDP and project team</li> </ul>
Is the project relevant	<ul style="list-style-type: none"> <li>• How does the project support the environment and sustainable development objectives of Botswana?</li> </ul>	<ul style="list-style-type: none"> <li>• Degree to which the project supports national environmental objectives</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents</li> <li>• National policies and</li> </ul>	<ul style="list-style-type: none"> <li>• Documents analyses</li> </ul>

to the Republic of Botswana's environment and sustainable development objectives?	<ul style="list-style-type: none"> <li>Is the project country-driven?</li> <li>What was the level of stakeholder participation in project design?</li> <li>What was the level of stakeholder ownership in implementation?</li> <li>Does the project adequately take into account the national realities, both in terms of institutional and policy framework in its design and its implementation?</li> </ul>	<ul style="list-style-type: none"> <li>Degree of coherence between the project and national priorities, policies and strategies</li> <li>Appreciation from national stakeholders with respect to adequacy of project design and implementation to national realities and existing capacities</li> <li>Level of involvement of government officials and other partners in the project design process</li> <li>Coherence between needs expressed by national stakeholders and UNDP-GEF criteria</li> </ul>	<ul style="list-style-type: none"> <li>strategies</li> <li>Key project partners</li> </ul>	<ul style="list-style-type: none"> <li>Interviews with UNDP and project partners</li> </ul>
Is the project addressing the needs of target beneficiaries at the local and regional levels?	<ul style="list-style-type: none"> <li>How does the project support the needs of relevant stakeholders?</li> <li>Has the implementation of the project been inclusive of all relevant stakeholders?</li> <li>Were local beneficiaries and stakeholders adequately involved in project design and implementation?</li> </ul>	<ul style="list-style-type: none"> <li>Strength of the link between expected results from the project and the needs of relevant stakeholders</li> <li>Degree of involvement and inclusiveness of stakeholders in project design and implementation</li> </ul>	<ul style="list-style-type: none"> <li>Project partners and stakeholders</li> <li>Needs assessment studies</li> <li>Project documents</li> </ul>	<ul style="list-style-type: none"> <li>Document analysis</li> <li>Interviews with relevant stakeholders</li> </ul>
Is the project internally coherent in its design?	<ul style="list-style-type: none"> <li>Are there logical linkages between expected results of the project (log frame) and the project design (in terms of project components, choice of partners, structure, delivery mechanism, scope, budget, use of resources etc)?</li> <li>Is the length of the project sufficient to achieve project outcomes?</li> </ul>	<ul style="list-style-type: none"> <li>Level of coherence between project expected results and project design internal logic</li> <li>Level of coherence between project design and project implementation approach</li> </ul>	<ul style="list-style-type: none"> <li>Program and project documents</li> <li>Key project stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Document analysis</li> <li>Key interviews</li> </ul>
How is the project relevant with respect to other donor-supported activities?	<ul style="list-style-type: none"> <li>Does the GEF funding support activities and objectives not addressed by other donors?</li> <li>How do GEF-funds help to fill gaps (or give additional stimulus) that are necessary but are not covered by other donors?</li> <li>Is there coordination and complementarity between donors?</li> </ul>	<ul style="list-style-type: none"> <li>Degree to which program was coherent and complementary to other donor programming nationally and regionally</li> </ul>	<ul style="list-style-type: none"> <li>Documents from other donor supported activities</li> <li>Other donor representatives</li> <li>Project documents</li> </ul>	<ul style="list-style-type: none"> <li>Documents analyses</li> <li>Interviews with project partners and relevant stakeholders</li> </ul>
Does the project provide relevant lessons and experiences for other similar projects in the future?	<ul style="list-style-type: none"> <li>Has the experience of the project provided relevant lessons for other future projects targeted at similar objectives?</li> </ul>		<ul style="list-style-type: none"> <li>Data collected throughout evaluation</li> </ul>	<ul style="list-style-type: none"> <li>Data analysis</li> </ul>

**Effectiveness:** To what extent have/will the expected outcomes and objectives of the project been/be achieved?

Has the project been effective in achieving the expected outcomes and objectives?	<ul style="list-style-type: none"> <li>Has the project been effective in achieving its expected outcomes? <ol style="list-style-type: none"> <li>Institutional capacity in place to assess, plan and implement priority renewable energy programs taking advantage of newly available EU and other donors funding mechanisms</li> <li>Rural villagers capacity and incentives for and participation in promoting the use of solar home systems is improved</li> <li>Monitoring and evaluation program for the RERE Solar PV</li> <li>National Energy policy incorporates project experience</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>See indicators in project document results framework and logframe</li> </ul>	<ul style="list-style-type: none"> <li>Project documents</li> <li>Project team and relevant stakeholders</li> <li>Data reported in project annual and quarterly reports</li> </ul>	<ul style="list-style-type: none"> <li>Documents analysis</li> <li>Interviews with project team</li> <li>Interviews with relevant stakeholders</li> </ul>
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How is risk and risk mitigation being managed?	<ul style="list-style-type: none"> <li>How well are risks, assumptions and impact drivers being managed?</li> <li>What was the quality of risk mitigation strategies developed? Were these sufficient?</li> <li>Are there clear strategies for risk mitigation related with long-term sustainability of the project?</li> </ul>	<ul style="list-style-type: none"> <li>Completeness of risk identification and assumptions during project planning and design</li> <li>Quality of existing information systems in place to identify emerging risks and other issues</li> <li>Quality of risk mitigations strategies developed and followed</li> </ul>	<ul style="list-style-type: none"> <li>Project documents</li> <li>UNDP, project team, and relevant stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Document analysis</li> <li>Interviews</li> </ul>
What lessons can be drawn regarding effectiveness for other similar projects in the future?	<ul style="list-style-type: none"> <li>What lessons have been learned from the project regarding achievement of outcomes?</li> <li>What changes could have been made (if any) to the design of the project in order to improve the achievement of the project's expected results?</li> </ul>		<ul style="list-style-type: none"> <li>Data collected throughout evaluation</li> </ul>	<ul style="list-style-type: none"> <li>Data analysis</li> </ul>

**Efficiency:** Was the project implemented efficiently, in-line with international and national norms and standards?

Was project support provided in an efficient way?	<ul style="list-style-type: none"> <li>Was adaptive management used or needed to ensure efficient resource use?</li> <li>Did the project logical framework and work plans and any changes made to them use as management tools during implementation?</li> <li>Were the accounting and financial systems in place adequate for project management and producing accurate and timely financial information?</li> <li>Were progress reports produced accurately, timely and responded to reporting requirements including adaptive management changes?</li> <li>Was project implementation as cost effective as originally proposed (planned vs. actual)</li> <li>Did the leveraging of funds (co-financing) happen as planned?</li> <li>Were financial resources utilized efficiently? Could financial resources have been used more efficiently?</li> <li>Was procurement carried out in a manner making efficient use of project resources?</li> <li>How was results-based management used during project implementation?</li> </ul>	<ul style="list-style-type: none"> <li>Availability and quality of financial and progress reports</li> <li>Timeliness and adequacy of reporting provided</li> <li>Level of discrepancy between planned and utilized financial expenditures</li> <li>Planned vs. actual funds leveraged</li> <li>Cost in view of results achieved compared to costs of similar projects from other organizations</li> <li>Adequacy of project choices in view of existing context, infrastructure and cost</li> <li>Quality of results-based management reporting (progress reporting, monitoring and evaluation)</li> <li>Occurrence of change in project design/ implementation approach (i.e. restructuring) when needed to improve project efficiency</li> <li>Cost associated with delivery mechanism and management structure compare to alternatives</li> </ul>	<ul style="list-style-type: none"> <li>Project documents and evaluations</li> <li>UNDP</li> <li>Project team</li> </ul>	<ul style="list-style-type: none"> <li>Document analysis</li> <li>Key interviews</li> </ul>
How efficient are partnership arrangements for the project?	<ul style="list-style-type: none"> <li>To what extent partnerships/linkages between institutions/ organizations were encouraged and supported?</li> <li>Which partnerships/linkages were facilitated? Which ones can be considered sustainable?</li> <li>What was the level of efficiency of cooperation and collaboration arrangements?</li> <li>Which methods were successful or not and why?</li> </ul>	<ul style="list-style-type: none"> <li>Specific activities conducted to support the development of cooperative arrangements between partners,</li> <li>Examples of supported partnerships</li> <li>Evidence that particular partnerships/linkages will be sustained</li> <li>Types/quality of partnership cooperation methods utilized</li> </ul>	<ul style="list-style-type: none"> <li>Project documents and evaluations</li> <li>Project partners and relevant stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Document analysis</li> <li>Interviews</li> </ul>
Did the project efficiently utilize local capacity in implementation?	<ul style="list-style-type: none"> <li>Was an appropriate balance struck between utilization of international expertise as well as local capacity?</li> <li>Did the project take into account local capacity in design and implementation of the project?</li> <li>Was there an effective collaboration between institutions responsible</li> </ul>	<ul style="list-style-type: none"> <li>Proportion of expertise utilized from international experts compared to national experts</li> <li>Number/quality of analyses done to assess local capacity potential and absorptive capacity</li> </ul>	<ul style="list-style-type: none"> <li>Project documents and evaluations</li> <li>UNDP</li> <li>Beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>Document analysis</li> <li>Interviews</li> </ul>

What lessons can be drawn regarding efficiency for other similar projects in the future?	for implementing the project?			
	<ul style="list-style-type: none"> <li>• What lessons can be learnt from the project regarding efficiency?</li> <li>• How could the project have more efficiently carried out implementation (in terms of management structures and procedures, partnerships arrangements etc...)?</li> <li>• What changes could have been made (if any) to the project in order to improve its efficiency?</li> </ul>	•	• Data collected throughout evaluation	• Data analysis

**Results:** What are the current actual, and potential long-term, results of activities supported by the project?

How is the project effective in achieving its long-term objectives?	<ul style="list-style-type: none"> <li>• Will the project achieve its overall objective to “reduce Botswana’s energy-related CO<sub>2</sub> emissions by promoting renewable and low GHG technologies as a substitute for fossil fuel (fuel wood, paraffin and coal) utilized in rural areas and the activities proposed in the project to remove barriers to the wide-scale utilization of renewable energy and low GHG technologies to meet the basic electricity needs of individual households”?</li> <li>• What barriers remain to achieving long-term objectives, or what necessary steps remain to be taken by stakeholders to achieve sustained impacts and Global Environmental Benefits?</li> <li>• Are there unanticipated results achieved or contributed to by the project?</li> </ul>	<ul style="list-style-type: none"> <li>• Change in capacity: <ul style="list-style-type: none"> <li>○ To pool/mobilize resources</li> <li>○ For related policy making and strategic planning</li> <li>○ For implementation of related laws and strategies through adequate institutional frameworks and their maintenance</li> </ul> </li> <li>• Change in use and implementation of sustainable livelihoods</li> <li>• Change in the number and strength of barriers such as: <ul style="list-style-type: none"> <li>○ Knowledge about climate change and sustainable use of energy resources, and economic incentives in these areas</li> <li>○ Cross-institutional coordination and inter-sectoral dialogue</li> <li>○ Knowledge of climate change and sustainable use practices by end users</li> <li>○ Coordination of policy and legal instruments incorporating new and renewable energy strategies</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Project documents</li> <li>• Key stakeholders</li> <li>• Monitoring data</li> </ul>	<ul style="list-style-type: none"> <li>• Documents analysis</li> <li>• Meetings with UNDP, project team and project partners</li> <li>• Interviews with project beneficiaries and other stakeholders</li> </ul>
How is the project effective in achieving the objectives of the UNFCCC?	<ul style="list-style-type: none"> <li>• What are the impacts or likely impacts of the project? <ul style="list-style-type: none"> <li>○ On the local environment;</li> <li>○ On economic well-being;</li> <li>○ On other socio-economic issues.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Provide specific examples of impacts at household and village levels, as relevant</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents</li> <li>• UNFCCC documents</li> <li>• Key Stakeholders</li> <li>• Monitoring data</li> </ul>	<ul style="list-style-type: none"> <li>• Data analysis</li> <li>• Interviews with key stakeholders</li> </ul>
Future directions for results	<ul style="list-style-type: none"> <li>• How can the project build on its successes and learn from its weaknesses in order to enhance the potential for impact of ongoing and future initiatives?</li> </ul>		<ul style="list-style-type: none"> <li>• Data collected throughout evaluation</li> </ul>	<ul style="list-style-type: none"> <li>• Data analysis</li> </ul>

**Sustainability:** Are the conditions in place for project-related benefits and results to be sustained?

Are sustainability issues adequately integrated in project design?	<ul style="list-style-type: none"> <li>• Were sustainability issues integrated into the design and implementation of the project?</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence / quality of sustainability strategy</li> <li>• Evidence / quality of steps taken to ensure sustainability</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents and evaluations</li> <li>• UNDP and project personnel and project partners</li> <li>• Beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• Document analysis</li> <li>• Interviews</li> </ul>
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Financial sustainability	<ul style="list-style-type: none"> <li>• Did the project adequately address financial and economic sustainability issues?</li> <li>• Are the recurrent costs after project completion sustainable?</li> </ul>	<ul style="list-style-type: none"> <li>• Level and source of future financial support to be provided to relevant sectors and activities after project ends</li> <li>• Evidence of commitments from international partners, governments or other stakeholders to financially support relevant sectors of activities after project end</li> <li>• Level of recurrent costs after completion of project and funding sources for those recurrent costs</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents and evaluations</li> <li>• UNDP and project personnel and project partners</li> <li>• Beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• Document analysis</li> <li>• Interviews</li> </ul>
Institutional and governance sustainability	<ul style="list-style-type: none"> <li>• Were the results of efforts made during the project implementation period well assimilated by organizations and their internal systems and procedures?</li> <li>• Is there evidence that project partners will continue their activities beyond project support?</li> <li>• What degree is there of local ownership of initiatives and results?</li> <li>• Were laws, policies and frameworks addressed through the project, in order to address sustainability of key initiatives and reforms?</li> <li>• What is the level of political commitment to build on the results of the project?</li> <li>• Are there policies or practices in place that create perverse incentives that would negatively affect long-term benefits?</li> </ul>	<ul style="list-style-type: none"> <li>• Degree to which project activities and results have been taken over by local counterparts or institutions/organizations</li> <li>• Level of financial support to be provided to relevant sectors and activities by in-country actors after project end</li> <li>• Efforts to support the development of relevant laws and policies</li> <li>• State of enforcement and law making capacity</li> <li>• Evidences of commitment by government enactment of laws and resource allocation to priorities</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents and evaluations</li> <li>• UNDP and project personnel and project partners</li> <li>• Beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• Document analysis</li> <li>• Interviews</li> </ul>
Social-economic sustainability	<ul style="list-style-type: none"> <li>• Did the project contribute to key building blocks for socio-economic sustainability?</li> <li>• Did the project contribute to local stakeholders' acceptance of effective agro-environmental schemes?</li> <li>• Are there adequate market incentives to ensure sustained environmental and economic benefits achieved through the project?</li> </ul>	<ul style="list-style-type: none"> <li>• Example of contributions to sustainable socio-economic changes in support of national development goals and strategies</li> <li>• Examples of contributions to sustainable socio-economic changes in support of the objectives of the UNCBD and other conventions</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents and evaluations</li> <li>• UNDP, project personnel and project partners</li> <li>• Beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• Interviews</li> <li>• Documentation review</li> </ul>
Environmental sustainability	<ul style="list-style-type: none"> <li>• Are there risks to the environmental benefits that were created or that are expected to occur?</li> <li>• Are there long-term environmental threats that have not been addressed by the project?</li> <li>• Have any new environmental threats emerged in the project's lifetime?</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence of potential threats such as infrastructure development</li> <li>• Assessment of unaddressed or emerging threats</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents and evaluations</li> <li>• Threat assessments</li> <li>• Government documents or other external published information</li> <li>• UNDP, project personnel and project partners</li> <li>• Beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• Interviews</li> <li>• Documentation review</li> </ul>
Individual, institutional and systemic capacity development	<ul style="list-style-type: none"> <li>• Is the capacity in place at the regional, national and local levels adequate to ensure sustainability of the results achieved to date?</li> <li>• Were the necessary related capacities for lawmaking and enforcement built?</li> </ul>	<ul style="list-style-type: none"> <li>• Elements in place in those different management functions, at the appropriate levels (regional, national and local) in terms of adequate structures, strategies, systems, skills, incentives and interrelationships with other key actors</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents</li> <li>• UNDP, project personnel and project partners</li> <li>• Beneficiaries</li> <li>• Capacity assessments available, if any</li> </ul>	<ul style="list-style-type: none"> <li>• Interviews</li> <li>• Documentation review</li> </ul>
Replication	<ul style="list-style-type: none"> <li>• Were project activities and results replicated nationally and / or scaled up?</li> <li>• What was the project contribution to replication or scaling up</li> </ul>	<ul style="list-style-type: none"> <li>• Number/quality of replicated initiatives</li> <li>• Number/quality of replicated innovative initiatives</li> <li>• Scale of additional investment leveraged</li> </ul>	<ul style="list-style-type: none"> <li>• Other donor programming documents</li> <li>• Beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• Document analysis</li> <li>• Interviews</li> </ul>

Challenges to sustainability of the project	<p>actively or passively promoted?</p> <ul style="list-style-type: none"> <li>• Were project activities and results replicated or scaled-up in other countries?</li> </ul>		<ul style="list-style-type: none"> <li>• UNDP, project personnel and project partners</li> </ul>	
	<ul style="list-style-type: none"> <li>• What are the main challenges that may hinder sustainability of efforts?</li> <li>• Have any of these been addressed through project management?</li> <li>• What could be the possible measures to further contribute to the sustainability of efforts achieved with the project?</li> </ul>	<ul style="list-style-type: none"> <li>• Challenges in view of building blocks of sustainability as presented above</li> <li>• Recent changes which may present new challenges to the project</li> <li>• Education strategy and partnership with school, education institutions etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Project documents and evaluations</li> <li>• Beneficiaries</li> <li>• UNDP, project personnel and project partners</li> </ul>	<ul style="list-style-type: none"> <li>• Document analysis</li> <li>• Interviews</li> </ul>
Future directions for sustainability and catalytic role	<ul style="list-style-type: none"> <li>• Which areas/arrangements under the project show the strongest potential for lasting long-term results?</li> <li>• What are the key challenges and obstacles to the sustainability of results of the project initiatives that must be directly and quickly addressed?</li> <li>• How can the experience and good project practices influence the strategies for use of renewable energy in particular solar energy.</li> <li>• Are national decision-making institutions prepared to continue improving their strategy for effective promotion on the use of solar energy?</li> </ul>		<ul style="list-style-type: none"> <li>• Data collected throughout evaluation</li> </ul>	<ul style="list-style-type: none"> <li>• Data analysis</li> </ul>

### Annex 3: Itinerary and Interview Schedule.

Date	Time	Person to Meet	Address and Role in the Project
19 May 2011	1230-1300hrs	David Lesolle	Former member of the National Climate Change Committee and Formulation Team for the Solar PV Project; email: <a href="mailto:rralekgotla@yahoo.co.uk">rralekgotla@yahoo.co.uk</a> ; Cell: +267 72 857 121
19 May 2011	1700-1730hrs	Ingrid Otukile	GEF National Focal Point, Department of Environmental Affairs. Email: <a href="mailto:iotukile@gov.bw">iotukile@gov.bw</a> and Energy & Water Resources; Tel: +267 3902050/3644610/72408852
20 May 2011	0730-0745hrs	Phillimon Dhafana	Acting Director Rural Business Unit, BPC; Solar PV Project Manager; Tel: +267 360 3349
20 May 2011	0900-1000hrs	Kesetsenao Molosiwa	Energy Policy Division, Energy Affairs of Department; Tel: +267 391 4221
20 May 2011	1100-1130hrs	Khin-Sandi Lwin	Resident Representative/UN Resident Coordinator UNDP
23 May 2011	0800-0830hrs	Rebonyebatho Moaneng	Assistant Resident Representative (Programmes) M&E and Audit Focal person UNDP <a href="mailto:r.moaneng@undp.org">r.moaneng@undp.org</a>
23 <sup>rd</sup> May 2011	10000-1100hrs	W. Kgabung	General Manager of BPC-Lesedi; Tel: +267 391 1299
23 <sup>rd</sup> May 2011	10000-1100hrs	T. Boussard	Operations Manager BPC Lesedi; Tel: +267 391 1299
23 <sup>rd</sup> May 2011	10000-1100hrs	Gordon Molefe	Customer Relations Manager - BPC;

			Tel: +267 360 3571
23 <sup>rd</sup> May 2011	10000-1100hrs	B. Moloji	Financial Controller - BPC; Tel: +267 360 3344
23 <sup>rd</sup> May 2011	10000-1100hrs	Masego Kealotswe	Rural Electrification Coordinator-BPC [also heading the Energy & Gender initiative of BPC]; Tel: +267 360 3266
24 May 2011	1430-1630hrs	Phillimon Dhafana	Acting Director Rural Business Unit, BPC; Solar PV Project Manager; Tel: +267 360 3349 71318931
25 May, 2011	0745-0800hrs	Dr. Benoni Kofi Erskine	Director of Energy Affairs of Department; Tel: +267 391 4221
25 May, 2011	0730-0830hrs	Oagile Setlhare	Senior Energy Officer (Desk Officer for Solar PV Project); Tel: +267 391 4221
25 May 2011	0900-1000hrs	W. Kgabung	General Manager of BPC-Lesedi; Tel: 3911299, cell: 72339846; <a href="mailto:wmgabung@bpclesedi.co.bw">wmgabung@bpclesedi.co.bw</a>
25 May 2011	1000-1030hrs	Mr.Khumoyame Masonya	BPC Lesedi Regional Manager, Gaborone; <a href="mailto:kmasonya@bpclesedi.co.bw">kmasonya@bpclesedi.co.bw</a>
25 May 2011	1100-1130hrs	Masego Kealotswe	Rural Electrification Coordinator BPC 3603266 Email: <a href="mailto:kealotswem@bpc.bw">kealotswem@bpc.bw</a>
25 May 2011	1130-1200hrs	Daniel Mothei	Financial Controller; BPC Email: <a href="mailto:motheid@bpc.bw">motheid@bpc.bw</a> +267 3603343
25 May 2011	1600-1700hrs	Mr. Asgobom	General Manager - Solar International Botswana (Pty) Ltd [representing private sector in the PSC] Email: <a href="mailto:SIB@info.bw">SIB@info.bw</a> P.O. Box 149 Gaborone +267 3904065/3182890 75438355
26 May 2011	1000-1100hrs	Local field visits	Solar International Botswana
26 May 2011	1400-1430hrs	Aaron Somolekae	EAD

			Email: <a href="mailto:asomolekae@gov.bw">asomolekae@gov.bw</a> +267 3640200
26 May 2011	1500-1530hrs	Alice Mmolawa	GICC
27 May 2011	1100-1200hrs	Leonard Dikobe	Programme Specialist (Energy and Environment) UNDP +267 3633711 Email: <a href="mailto:leonard.dikobe@undp.org">leonard.dikobe@undp.org</a>
27 May 2011	1230-1300hrs	Alban Motsepe	Acting Director – Corporate Services [Alternate Chair of PSC]; Tel: +267 3603304
27 May 2011	1500-1530hrs	Portia Rranyenna	Bank Gaborone <a href="tel:+26771302350">713 023 50</a>
29 May 2011	1530-1600hrs	Paul Amambia	Former Project Engineer, Solar PV Project; email: <a href="mailto:pca4@yahoo.com">pca4@yahoo.com</a> ; Cell: +254 721 690 529 or +254 736 700 302 <b>Meeting through Skype</b>
30 May 2011	0730-1630hrs	Field Visits	Lentsweletau and Medie
31 May 2011	0730-1630hrs	Field Visits	Ramotswa
June 1, 2011	1030-1100hrs	Felix Chavaphi	Managing Director Solar Hart +267 3922795 71410981 <a href="mailto:fchavaphi@solahart.co.bw">fchavaphi@solahart.co.bw</a>
June 1, 2011	1130-1200hrs	Rebonyebatho Moaneng	Assistant Resident Representative (Programmes) M&E and Audit Focal person UNDP <a href="mailto:r.moaneng@undp.org">r.moaneng@undp.org</a>
June 1, 2011	1230-1300hrs	Mr. Bokete Mokgosi	Director SMME Environment Development Services

			<p>Tel: 3644000</p> <p>Email: <a href="mailto:bmokgosi@lea.co.bw">bmokgosi@lea.co.bw</a></p> <p>Cc: <a href="mailto:cbrown@lea.co.bw">cbrown@lea.co.bw</a></p>
June 1, 2011	1600-1700hrs	Leonard Dikobe	<p>Programme Specialist (Energy and Environment)</p> <p>UNDP</p> <p>+267 3633711</p> <p>Email: <a href="mailto:leonard.dikobe@undp.org">leonard.dikobe@undp.org</a></p>
June 7, 2011	0800-0900hrs	B. Paya	<p>Permanent Secretary to the Ministry of Minerals, Energy &amp; Water Resources [PSC Chair];</p> <p>Fairground Office Park, Block 6</p> <p>Tel: +267 364 0200</p>
June 8, 2011	0830-900am	Nozipho Wright	<p>Nozipho Wright</p> <p>BOTEC</p>
June 8, 2011	1400-1430hrs	Peter Gabaratane	<p>Mr. Peter Gabaratane</p> <p>BOTA</p> <p>+267 3657200</p> <p>Mobile: 74012133</p>
June 8, 2011	1530-1600hrs	Mr. N. J. Raleru	<p>CEO – BPC [PSC member];</p> <p>Tel: +267 391 1299</p>
10 June 2011	0900-1230hrs	Presentation of Draft report on the Terminal Evaluation for the Solar PV Project	UNDP Offices
	Already sent email	Andrew Mears- <b>meeting through Skype</b>	Former Chief Technical Advisor for the Project, email: <a href="mailto:andrew@majorityworld.com.au">andrew@majorityworld.com.au</a>
	Already sent email	Monica Ann Williams- <b>meeting through Skype</b>	Former Business Development Manager – Solar PV Project; email: <a href="mailto:monwin_ann@hotmail.com">monwin_ann@hotmail.com</a> , <a href="mailto:monwin_ann@yahoo.com">monwin_ann@yahoo.com</a> ; Cell: +246 231 7725



## Annex 4: List of Documents Reviewed.

1. ADF Loan Guarantee Position Paper
2. Audit Report (2008)
3. Audit Report (2009) by Price Waterhouse Cooper.
4. Bank Gaborone, “RE Product Scheme in Partnership with BPC Lesedi, Power Point Presentation, 2011.
5. BPC Lesedi Business Plan.
6. BPC (May 2008), “Impact Monitoring Stakeholder Workshop Report”, BPC Training Center.
7. BPC (2009), “End User Manual”.
8. BPC (2009) “PV Market Survey Report”..
9. BPC, “Technical Sales Manual on Solar PV System”.
10. BPC Lesedi (March 2009), “Carbon Market Feasibility Study”, Presented to the TAG.
11. BPC Lesedi, “MOU between Local Enterprize Authority and BPC Lesedi”.
12. BPC Lesedi, “Basic Business Skills Training” facilitators Manual.
13. BPC Lesedi, “Systems and Procedures Governing Fanchise Operations”.
14. BPC Lesedi, “Operations and Procedures Manual for Energy Store Franchisees”.
15. BPC Lesedi Share Holders Agreement with the EDF.
16. Buti Mgotsi and Andrew Mears, (Jan 2008), “Thematic Review Report”, for the DOE, MMEWR,
17. Technical Sales Manual
18. Coleman Tony ( ), “The Governance of Clean Energy Development, Working Paper 006: A Case study of Botswana and its Stakeholders” University of Anglia.
19. COMPETE (Jan 2008), - Competence Platform on Energy & Agroforestry Systems in Arid and Semi-Arid Ecology – Africa, “National Policies and Strengthening Bioenergy in Africa”, funded by European Commission.
20. ENERGIA, “Gender mainstreaming Action Plan for the RERE Project.
21. Global Environment Facility (2006), “The GEF Monitoring and Evaluation Policy”, Evaluation Document No.1, GEF Evaluation Office.
22. Global Environment Facility (2008), “Guidelines for GEF Agencies Conducting Terminal Evaluation”, Document No. 3.
23. GEF (April, 2008), “Manual for calculating GHG benefits of GEF projects: energy efficiency and renewable energy projects”.
24. Government of Botswana (2003), MMEWR, “The Botswana Energy Master Plan”.
25. Government of Botswana (Nov 2004), “Initial National Communication to the UNFCCC, “Final Report.
26. Government of Botswana (Nov 2004), “Botswana Technology Needs Assessment”.
27. Government of Botswana, (Nov 2010), MMEWR, “Draft National Energy Policy”.
28. Government of Botswana, “RE Botswana & Madirelo Training and Testing Center (MTTC), “1<sup>st</sup> PV Pilot Training Course, Ghanzi”.
29. Government of Botswana, “NDP 10”.
30. IFC (2007), “Selling Solar – More than a decade of IFC Experience”.
31. JICA (2003), “Master Plan Study on Rural Electrification using PV”.
32. Ketlogetswe, C., “Lessons and Challenges Encountered in the Implementation of Solar Energy – The Case of Botswana”, *Department of Mechanical Engineering, University of Botswana, Gaborone, P/Bag 0061, Botswana*
33. Kiravu, C. et al., “Towards Sustainable Energy Management in Botswana, “University of Botswana and Tshwane University of Technology, Pretoria, South Africa.

34. Martnot, E., Ramankutty, R., Ritner, F., (2000) “GEF Solar Portfolio – Emerging Experience and Lessons”.
35. MMEWR, (Dec 2006), “MOU between BPC and Government of Botswana”.
36. MMEWR (2009) , Energy Policy Review (2009) Sponsored by UNDP/GEF, Report of the Task Force on Energy Policy Review.
37. Project Implementing Reports (PIRs)
38. Project Coordination Working Group Meeting minutes.
39. Project Steering Committee Meeting minutes ( )
40. Quarterly Progress Reports -
41. Themb, “Godfrey (2004), Preparation of the National Energy Policy Document”” Seminar Proceedings, University of Botswana.
42. UNDP Botswana (Nov 2003), “ RERE Project Executive Summary”, submitted to the GEF Council.
43. UNDP Botswana ( ), “ RERE PDF Final.
44. UNDP Botswana (June 2005), RERE Prodoc”.
45. UNDP (March 2009), “ Country Program Document for Botswana (2010-2014).
46. UNDP (2009), “handbook on Planning, Monitoring and Evaluation for Development Results”.
47. UNDP (May 2009), “Assessment of Development Results of Botswana, Evaluation of UNDP Contribution.
48. UNDP (2010), “ The Evaluating Policy of UNDP”.
49. UNEG (2008), “ United nations Evaluation Group, “ Code of Conduct for Evaluation the UN System”.
50. UNEG (2008), “ Ethical Guidelines for Evaluation”.
51. UNEG (2005), “ Norms for Evaluation in the UN Systems”.
52. UNEG (2005), “ Standards for Evaluation in the UN Systems”.
53. UN System (2007), “ 2<sup>nd</sup> Common Assessment for Botswana”, Final Report.
54. UN System (2003), “ UN Development Assistance Framework for Botswana,” 2003-2007.
55. UN System (2010), “UN Development Assistance Framework for Botswana,” 2010-2016.
56. UNDP Combined Delivery Reports (CDR).
57. F.D.J. Nieuwenhout, A. van Dijk, V.A.P. van Dijk, D. Hirsch, P.E. Lasschuit, G. van Roekel,
- 58.** World Bank ( Sep, 2007), H. Arriaza, M. Hankins, B.D. Sharma, H. Wade, “ Monitoring and Evaluation of Solar Home Systems - Experiences with applications of solar PV for households in developing countries”.

## Annex 5: Terminal Evaluation Interview Guide.

### Annex 2 Botswana RERE Terminal Evaluation Interview Guide

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#### Dear Interviewee

As a key stakeholder in the RERE project, you are requested to participate in this interview by the independent consultant for the Terminal Evaluation (TE) of the RERE as per the standard UNDP/GEF Monitoring and Evaluation Policies and Guidelines<sup>7</sup>.

There are four objectives to this independent review, namely:

1. Monitor and evaluate results and impacts;
2. Provide a basis for decision making on necessary amendments and improvements;
3. Promote accountability for resource use; and
4. Document, provide feedback on, and disseminate lessons learned.

A variety of instruments is being used to undertake the TE, and one these is the use of this questionnaire. In this regard, your views about the various aspects of the RERE are being sought. Please note that the International Consultant will carry out an in-country mission during mid-May to mid-June 2011.

Although you are encouraged to identify yourself, please note that you have the right to anonymity. In the event that you wish to remain anonymous, do however indicate the stakeholder group that you belong to.

Below is the description of the project Goal, Objective, Outcomes and Outcomes.

#### Goal/Objective/Outcomes/Outputs

**Global Goal** (End-users surveys, PMU, MME, Bureau of Statistics)

- Consumption of paraffin reduced by 80% in households using PV-based systems for lighting compared to the baseline.
- Small-scale PV-based business activities increase by 30% when compared to baseline year

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<sup>7</sup> Guidelines for GEF Agencies in Conducting Terminal Evaluations, Evaluation Document No. 3 (Global Environment Facility, Evaluation Office, 2008); and The GEF Monitoring and Evaluation Policy, Evaluation Document No. 1 (Global Environment Facility, Evaluation Office, 2006) – both documents accessed at <http://thegef.org>.

- Consumption of grid electricity by households that have installed a PV system Renewable energy main-streamed into national policy making and planning within 10 years.
- Incidence of paraffin-related respiratory and eye diseases reduced by 10% over 20 years within those households using PV-based systems.

**Development Objective** (End-users surveys, PMU, MME, Bureau of Statistics)

- Number of systems (PV, Solar lanterns and LPG) sold in 2007, 2008, 2009, 2010.
- Survey report on impacts of RERE on end-users
- Number of people/households affected
- Number of social services affected
- Number of people with improved income (proxy – decrease in electricity bill by 40%, after the payback period of a PV, savings (i.e. disposable income) increases by 40% of electricity bill in baseline).

**Outcome 1 - *To implement three different delivery models targeting different enduser groups and making use of different PV and PV/LPG-based technology packages.***

- Number of households benefiting from PV system (PV, solar lanterns and PLG). Target was 5125.
- Number of households benefiting from SHS. Target was 1373.
- Number of villages/households connected to mobile 220 V PV mini-grid. Target was 1/15 households.

**Outcome 2 - *To assist with the development of policy and institutional arrangements conducive to the integration and provision of off-grid electricity services within the existing rural electrification program.***

- Number and type of new policy-regulatory measures introduced
- Development of guidelines on standards and codes of practices
- Ministries (apart from MME) that have integrated RE-based projects in their plans
- Inter-sectoral coordination structure on RE – has it been proposed / instituted
- Setting up of RE Institute that has taken over some non-core functions from MME
- The rate of reported system faults has decreased by 30% compared to the baseline year.
- Renewable energy-based (rural) electricity features are integrated in national policy plans (NDP 10) as a cost-effective alternative.

**Outcome 3 -*To increase awareness and change perceptions among the general public, decision makers and rural customers on the potential role of PV and LPG in meeting basic energy needs.***

- Number of sales and/or loan applications for PV per type of customer
- Updated information on Cost/Benefits of PV
- C/B of social and productive uses of PV in rural areas
- Number of people reached through dissemination campaigns
- Number of people reached through workshops and meetings

- Number of on-site demonstrations of PV systems conducted
- Number of decision-makers briefed on PV
- Is Sustainable Energy Botswana society fully functional?
- Number and % of PV suppliers, NGOs and other organisations participating in RERE. Not less than 20% of the targeted 88 villages have been visited by (key) decision-makers during no less than five field trips during the implementation of the 5-year program.
- Number of customers enquiring for information about PV systems at local (rural) dealer/retailer shops has increased by 100% by Year 3 of the project implementation and by 200% by the end of the project compared to the baseline year.

**Outcome 4 - *To strengthen and support the public and private sector working in the PV and renewable energy sector to provide better quality of service to rural areas.***

- Number of businesses dealing with PV systems increased by 30% by the end of the project compared to the baseline year.
- Level of end-user satisfaction with installation and after-sales service (end-user survey)
- Rate of reported system faults
- Turnover of RET suppliers (no. of direct evidence)
- Number of personnel from government, NGOs and solar technicians trained in RET activities
- Number of technicians who have set up a small business or improved their services after participating in at least one training workshop
- Number of training centres capacitated to offer training on RETs

**Outcome 5 - *To assist with the development of appropriate financing mechanisms for the larger scale dissemination of PV-based technologies to rural customers.***

- The proposed subsidy disbursement scheme is operational and functions properly.
- Financing schemes are operational so that rural customers can purchase subsidized PV-based systems during the 5-year project period via retail shops.
- Number of loans granted and lending volume
- A strategy to reduce first cost is in place
- Capitalization and scaling up data for existing schemes

**Outcome 6 - *To disseminate experience and lessons learned to promote rapid implementation throughout the country of rural electrification based on renewable and low GHG technologies.***

- Number of lessons learned and dissemination activities
- Methodology for determining the impact of the project interventions exists and is applied.
- End-of-project study
- Completion of Project progress reports
- Completion of Terminal evaluation
- Data on RERE Quarterly and other publications
- Number of countries benefiting from RERE experiences

- The experiences of at least three countries outside Botswana will be monitored and used to steer the Botswana project implementation and design future developments.
- At least three trips have been organized for a combined target group of Government and Donor representatives (both from inside and outside Botswana) to the project area to observe PV systems in order to learn and share experiences

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**PART A - Details of Interviewee**

Name of person:

Affiliation (name of institution):

Address:

Date and Location of Interview:

**Please tick as appropriate in the following stages of involvement and include a brief description of your institution’s role and services in the RERE:**

Design:

Formulation:

Implementation;

Monitoring & Evaluation:

Beneficiary:

Other (please state):

**PART B - Specific Questions**

This part contains three sections each with a brief description of the information being sought followed by specific questions pertaining to the project, formulation, implementation and results of the RERE.

**Evaluation will be based on the following criteria:**

**Relevance** – The extent to which the project is suited to local and national development priorities and organizational policies, including changes over time;

**Effectiveness** – The extent to which an objective has been achieved or how likely it is to be achieved;

**Efficiency** – The extent to which results have been delivered with the least costly resources possible (while noting that this evaluation is not a financial audit);

**Results** – The positive and negative, and foreseen and unforeseen, changes to and effects produced by a development intervention. These include direct project outputs, short- to medium-term outcomes, and longer term impacts including global environmental benefits, replication effects, and other local effects;

**Sustainability** – The likely ability of the project to continue to deliver benefits for an extended period of time after completion – i.e. project should be environmentally, financially and socially sustainable. Including an appreciation of the extent to which benefits continue, within or outside the project domain after GEF assistance/external assistance in this phase has come to an end. Contribution to upgrading skills of the national staff.

**Stakeholder participation** – How well do you believe that the relevant project stakeholders were involved in the project design, formulation, implementation, and monitoring?

## **B.1 Project Formulation**

- *Conceptualization/Design(R)*. This should assess whether the approach used in design and selection of project interventions addressed the root causes and principal threats in the project area. It should also include an assessment of the logical framework and whether the different project components and activities proposed to achieve the objective were appropriate, viable and responded to contextual institutional, legal and regulatory settings of the project. It should also assess the indicators defined for guiding implementation and measurement of achievement and whether lessons from other relevant projects (e.g., same focal area) were incorporated into project design.
- *Country-ownership/Driveness*. Assess the extent to which the project idea/conceptualization had its origin within national, sectoral and development plans and focuses on national environment and development interests.
- *Stakeholder participation (R)* Assess information dissemination, consultation, and “stakeholder” participation in design stages.
- *Replication approach*. Determine the ways in which lessons and experiences coming out of the project were/are to be replicated or scaled up in the design and implementation of other projects (this also related to actual practices undertaken during implementation).

- *Linkages* between the project and other interventions within the sector and the definition of clear and appropriate management arrangements at the design stage. This element should also address the question of to what extent the project addresses UNDP priorities; gender, south-south cooperation, poverty-environment linkages (sustainable livelihoods) and disaster prevention and recovery. The linkages between the project and the UNDAF for the particular country/countries and the
  1. Do you believe that the issues the program sought to address have been clearly identified and the approach soundly conceived? (*Address the root causes and principal threats in the project area – barriers and risks*).
  2. Have the objectives and outputs of the program been stated explicitly and precisely in verifiable terms with observable success indicators? (*Assessment of the logical framework*).
  3. Have the relationship between objectives, outputs, activities and inputs of the program been logically articulated? (*Assess the indicators defined for guiding implementation and measurement of achievement and whether lessons from other relevant projects*).
  4. Have there been any major changes that have affected the project since its conceptualization and formulation?
  5. How relevant has RERE been to the development priorities of the country? (*Country-ownership/Driveness*).
  6. Which institutions have received the support of the project? (*Stakeholder participation, information dissemination, consultation*).
  7. Replication – see above.
  8. Linkages with other interventions within the sector; UNDP priorities, Gender, South-South cooperation, pov-env linkages (sust livelihoods), with UNDAF for Botswana.

## **B.2 Implementation:**

- *Implementation Approach (R)*. This should include assessments of the following aspects:
  - (i) The use of the logical framework as a management tool during implementation and any changes made to this as a response to changing conditions and/or feedback from M & E activities if required.
  - (ii) Other elements that indicate adaptive management such as comprehensive and realistic work plans routinely developed that reflect adaptive management and/or; changes in management arrangements to enhance implementation.
  - (iii) The project's use/establishment of electronic information technologies to support implementation, participation and monitoring, as well as other project activities.
  - (iv) The general operational relationships between the institutions involved and others and how these relationships have contributed to effective implementation and achievement of project objectives.
  - (v) Technical capacities associated with the project and their role in project development, management and achievements.
- *Monitoring and evaluation (R)*. Including an assessment as to whether there has been adequate periodic oversight of activities during implementation to establish the extent to which inputs, work schedules, other required actions and outputs are proceeding according to plan; whether formal evaluations have been held and whether action has been taken on the results of this monitoring oversight and evaluation reports.



- *Stakeholder participation (R)*. This should include assessments of the mechanisms for information dissemination in project implementation and the extent of stakeholder participation in management, emphasizing the following:
  - (i) The production and dissemination of information and lessons generated by the project.
  - (ii) Local resource users and NGOs participation in project implementation and decision making and an analysis of the strengths and weaknesses of the approach adopted by the project in this arena.
  - (iii) The establishment of partnerships and collaborative relationships developed by the project with local, national and international entities and the effects they have had on project implementation.
  - (iv) Involvement of governmental institutions in project implementation, the extent of governmental support of the project.
- *Financial Planning*: Including an assessment of:
  - (i) The actual project cost by objectives, outputs, activities
  - (ii) The cost-effectiveness of achievements
  - (iii) Financial management (including disbursement issues)
  - (iv) Co-financing
- *Procurement Management*: Including an assessment of:
  - (i) Technical and human resource capacity for procurement management
  - (ii) Linkage between work programming, procurement planning, budgeting, and disbursement planning
  - (iii) Effectiveness of procurement management, as indicated by results of audits (internal and/or external), and reports of review and supervision missions by IAs.
- *Sustainability*. Extent to which the benefits of the project will continue, within or outside the project domain, after it has come to an end. Relevant factors include for example: Development of a sustainability strategy, establishment of financial and economic instruments and mechanisms, mainstreaming project objectives into the economy or community production activities. Likelihood of benefits to continue within or outside the program after GEF assistance ends.

1. Has the project made use of an appropriate institutional arrangement to deliver its outcomes?
2. Have the interests of beneficiaries (communities and institutions) been duly addressed during implementation?
3. Has the RERE been responsiveness to any significant changes in its environment?
4. Have the lessons learned from the RERE or other relevant programs been duly taken into account during the implementation phase?
5. Were the monitoring and backstopping of the program by the Government and UNDP been as expected?
6. Has the Government counterpart inputs in terms of personnel, premises and indigenous equipment been adequate?

7. Stakeholder participation – see above issues.

8. Financial management/Co-financing/Effectiveness of procurement management. 1. Do you think that the RERE had adequate resources (financial, physical and manpower) in terms of both quantity and quality? 2. Did the program use its resources effectively (i.e. produced planned results)?

3. Did the program use its resources efficiently to achieve planned results?

9. Sustainability issues- see above Issues.

### **B.3 Results**

- *Attainment of Outcomes/ Achievement of objectives (R):* Including a description *and rating* of the extent to which the project's objectives (environmental and developmental) were achieved using Highly Satisfactory (HS), Satisfactory (S), Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U) and Highly Unsatisfactory (HU) ratings. If the project did not establish a baseline (initial conditions), the evaluators should seek to determine it through the use of special methodologies so that achievements, results and impacts can be properly established. You should use one rating per component. Please see attached guide to the ratings.

## **PART C – Conclusions, Recommendations and Lessons Learned**

### **C.1 Conclusions**

### **C.2 Recommendations**

- Corrective actions for the design, implementation, monitoring and evaluation of the project. Recommendations should be specific and clearly justified in relation to the achievement of the project objectives.
- Actions to follow up or reinforce initial benefits from the project.
- Proposals for future directions underlining main objectives
- Changes to project strategy, including the log frame indicators and targets.

### **C.3 Lessons learned**

- This should highlight the ‘best’ and ‘worst’ practices in addressing issues relating to relevance, performance and success.

1. Looking back on the RERE (i.e. with hindsight), what would you have done differently, if any, regarding any one of the dimensions listed in Section B.3.

2. Do you believe that the RERE has played a catalytic role in promoting Solar Energy Technologies (SETs) in Botswana?

3. Are there any risks that have not been identified in the project concerning the sustainability of project outcomes?

4. (a) Have there been factors outside the project boundary that have assisted project outcomes.

(b) Have there been factors outside the project boundary that have prevented project outcomes.

(c) Have there been factors within the project boundary that have prevented project outcomes.

5. (a) What do you believe the strengths of the RERE have been?

(b) What do you believe the weaknesses of the RERE have been? If there are any, please mention how they could have been overcome.

(c) Are there any opportunities that the RERE failed to capitalize on? If yes, please explain how they could have been reaped.

6. How has the RERE benefited beneficiary communities / end-users of Solar Energy Technologies?

7.(a) How would you rate the level of public awareness of SET (PV and solar lantern) in Botswana?

(b) How would you describe the level of social acceptability to SET (PV and solar lanterns) in Botswana?

8. Were the Solar Energy Technologies covered by the project suitable for Botswana?

9. Have there been any environmental impacts (positive and negative) at technology deployment sites? What remedial actions were taken for any 'negative' impacts?

10. What have been the major social impacts (positive and negative), including impact on the lives of women at technology deployment sites? What remedial actions were taken for any 'negative' impacts?

## **Annex 6: Questionnaire for Franchisees and Households and Interview Notes.**

### **Questionnaire on Franchisees**

- 1 Name of interviewee
- 2 Position in the company
- 3 Brief description on service provided by the company
- 4 Do you have competitors?
- 5 How many people are employed by this company?
- 6 What is the management structure like?
- 7 Could you provide a salary range for your employees?.....
- 8 What is the monthly wage bill for the company?.....
- 9 How many clients do you have?.....
- 10 Into what categories do your clients fall?.....
- 11 Did any client withdraw from your clientele?.....
- 12 If the answer to 11 is yes. How many and why?.....
- 13 Have you trained any of your staff?..... In what areas?.....
- 14 Did you do some baseline survey to access market potential?.....
- 15 Has grid extension affected or will affect your business?....
- 16 What major complaints do your customers have?.....
- 17 Any negative impacts of in the provision of your services?.....
- 18 How often do you do maintenance/ repairs ?.....
- 19 Have people found easy to use the PV systems?.....
- 20 What observable impact has your services had to clients?.....
- 21 Are there any dangers technicians face when doing installations? ...

### **Interview with SHS Users**

### **Questionnaire on Households**

**Name of Interviewee:**.....

Size of Family:.....

Size of PVs.....

Type of appliances.....

Other uses of solar home systems.....

What benefits would you say are there in having solar home systems?.....

Are there any problems you have faced with the solar home systems?.....

What were your energy expenses before acquiring solar home system?.....

What things were you spending on?.....

What is your current energy expenditure?.....

Have you had difficulties in handling the solar home systems?.....

What impacts has solar PV home system had on your family?.....



## Annex 7: Summary of Rating of Objectives, Outcomes and Outputs.

OVERALL PROJECT RATING : UNSATISFACTORY			
STRATEGY	INDICATORS	STATUS by June 15, 2011	RATING/COMMENT
<b>Global objective:</b> To reduce Botswana's energy related CO <sub>2</sub> emissions by substituting fossil fuels (petrol / diesel, wood fuel, paraffin and coal) with PV, rechargeable lanterns, and efficient wood fuel stoves for the purpose of providing basic energy services to rural customers and community users.	By the end of the project, consumption of paraffin reduced by 80% in households using PV-based systems for lighting compared to the baseline.	No data available.	<b>US:</b> Baseline was not quantified for the pilot villages and absence of recent consumer surveys not done.
	By the end of the project small-scale PV-based business activities increase by 30% when compared to baseline year.	3 Franchises set up in last few months only.	
	Renewable energy main-streamed into national policy making and planning within 10 years.	NDP 10 incorporates plan for promoting renewable energy including small scale for rural electrification.	<b>MS</b>
	Incidence of paraffin-related respiratory and eye diseases reduced by 10% over 20 years within those households using PV-based systems.	No reliable baseline available.	<b>US:</b> No consumer health survey or statistics to gauge improvement in health related problems.
<b>Development Objective:</b> To improve people's livelihoods by improving their access to and affordability of modern energy services and assist the Government of Botswana with the initiation of a renewable energy program for the rural areas, thus	Volume of sales by PV dealers increased by 60% by the end of the project.	About 242 SHS installed through May 2011. No data available for rechargeable lanterns and efficient stoves for this period but estimate to be around 300 for	<b>US:</b> Not achieved as the PV installation by BPC Lesedi started only in last 6 to 9 months. The actual number of installations is
	The number of PV dealers operating in the Botswana market increased by 30% by the end of the project.		

reducing the dependency on imported fossil Fuel.	The number of income generating activities emerged in combination with the turnover / profit of these activities / businesses. It is anticipated that in 2 years 1% and in 5 years 3% from the households supplied with PV systems will be involved in income generating activities	each. - No indication that additional PV private sector dealers have sprung up as a result of the project. Interviews with Solar International (SIB) and Energy Systems ( a subsidiary of the Australian Solar Hart) have been around a long time. -The Solar Industry Association of Botswana (SIAB) in spite of being assisted by UNDP to develop a business plan is defunct and not been active in past several months.	barely at 15% of the target set in Outcome 1 on SHS and less than 5% for lanterns and cooking stoves.
<b>Immediate Objective 1:</b> To implement three different delivery models targeting different end-user groups and making use of different PV and PV/LPG-based technology packages.	The number of PV systems sold in the targeted 88 villages during the 5-year project period will be 6,525 as compared to the baseline scenario of a few hundred.	3 charging stations installed in villages. Total SHS installation by end of May 2011 stands at 242 installed by BPC Lesedi in past few months and includes 35 or so installed by BPC in its initial pilot phase prior to the establishment of BPC Lesedi. Uptake is still slow as people find monthly fee high.	<b>US:</b> Total number of SHS installation is just at 15% of the target and less than 5% for lanterns and cooking stoves. Slow rate of setting up of franchisees is unlikely to scale up to reach target at any time in near future.
<b>Output 1.1:</b> In 88 villages, 5,152 households will be offered basic lighting and cooking facilities.	By the end of the project 5,152 PV systems are being used for lighting and cooking. Paraffin consumption for lighting has been reduced by 80% by the end of the project.	Amount of paraffin consumption not known as no data have been collected. Less than 300 solar lanterns and efficient cooking stoves sold. Exact May figures not available.	
<b>Output 1.2:</b> In 88 villages, 1,373 households will be offered SHS.	By the end of the project 1,373 SHS are being used for lighting, entertainment and small-scale income-generating activities. Paraffin consumption for lighting has been reduced by 80%.		
<b>Output 1.3:</b> In one village, a mobile PV mini-grid will be installed, operated and closely monitored.	220 V electricity - by means of a PV mini-grid - is being supplied in one village in Year 2 of the project connecting a minimum of 15	Only pre-feasibility study competed in early 2010 and final design being done while	



	Households.	tendering expected later this year.	
<b>Immediate Objective 2:</b> To assist with the development of policy and institutional arrangements conducive to the integration and provision of off-grid electricity services within the existing rural electrification program.	By the end of the project, renewable energy-based (rural) electricity features are integrated in national policy plans (NDP 10) as a cost-effective alternative.	NDP 10 incorporates plan for promoting renewable energy including small scale for rural electrification. However, not clear what is the actual budget set aside for RE. Energy Policy still at the draft stage since Nov, 2010 and to be finalized after a consultant comes on board. PS indicated that it will be submitted to the Parliament by July'11 and to be finalized by July'12.	MUS: In spite of significant public consultations and assistance by the Project, the policy is still at a draft stage. EAD did not utilize the services of an international consultant recruited by UNDP.
<b>Output 2.1:</b> A policy and implementation framework for renewable energy-based rural electrification (mainly PV systems) will be defined and is in place.			
<b>Output 2.2:</b> Standards for PV and PV/LPG components and systems will be updated and their use enforced.	The rate of reported system faults has decreased by 30% compared to the baseline year.	Standards could not be reviewed as no meetings was arranged with any official of the Botswana Bureau of Standards (BOBs). Interviews with BPC Lesedi Operations Manager and its PV Technical Officer as well as private dealers (SIB and Solar Hart) indicate that BOBs standards not used and certainly no enforcement. No statistics available on system faults.	<b>MU:</b> BOBs standards are either non existent or not being used. No consumer survey data available
<b>Immediate Objective 3:</b> To increase awareness and change perceptions among the general public, decision makers and rural customers on the potential role of PV and efficient cooking stoves in meeting basic energy needs.			<b>MS</b>
<b>Output 3.1:</b> Awareness program for decision-makers will be developed and implemented.	Not less than 20% of the targeted 88 villages have been visited by (key) decision-makers during no less than five field trips	Senior Govt. officials have recently visited some villages but well below the 20% target. MOF	MS:

	during the implementation of the 5-year program.	<p>launched BPC Lesedi's first franchising office in April 2011.</p> <p>Several briefings were made to the Councillors in 2007 and 2008 and some in 2009 but nothing recently. BPC Lesedi is working on a plan for further briefings.</p>	BPC Lesedi has a rolling plan for briefing for each region as they open their offices in the region. Pace is slow.
<b>Output 3.2:</b> A rural customer awareness program will be formulated and implemented.	Number of customers enquiring for information about PV systems at local (rural) dealer/retailer shops has increased by 100% by Year 3 of the project implementation and by 200% by the end of the project compared to the baseline year.	<p>This target seems to have been reached though no report was available.</p> <p>The interest for PV based systems in very encouraging judging by the many inquiries received at various forums. These include village meetings, exhibition fairs, agricultural shows, BPC offices and BPC Lesedi offices. Enquiries at BPC, Energy Affairs Division and BPC-Lesedi have increased by more than 300% per week since the start of the project</p> <p>A Communication Strategy under development by EAD not completed. Roles and responsibilities for awareness programs between EAD, BPC and BPC Lesedi marketing Officer not coordinated.</p>	<b>MS:</b> No clear strategy for communication developed yet, over lapping roles between EAD, BPC and BPC Lesedi. Greater coordination needed to develop and conduct more awareness programs. A consumer survey essential to assess satisfaction and follow up required.

<p><b>Immediate Objective 4:</b> To strengthen and support the public and private sector working in the PV and renewable energy sector to provide better quality of service to rural areas.</p>	<p>Number of businesses dealing with PV systems increased by 30% by the end of the project compared to the baseline year.</p>	<p>No data available.</p>	<p>US:</p>
	<p>Level of end-user satisfaction with installation and after sales service increased by 50% by the end of the project compared to the baseline year.</p>	<p>No data available.</p>	<p>US</p>
	<p>The percentage of PV-based systems introduced as part of the project that is still fully operational at mid-term of the project is 70% or above and 60% or above at the end of the project.</p>	<p>No data available.</p>	<p>US</p>
<p><b>Output 4.1:</b> Business development services in the renewable energy sector (mainly PV) will be strengthened.</p>	<p>At least 50% of all PV dealers/ companies participated in at least one capacity building activity offered by the project.</p>	<p>PV training manuals have been developed. PV Pilot courses have been offered to more than 45 technicians. PV Course have been approved for official launch in September 2010 but to be offered in 2011.</p>	<p>MS: No data being kept by BPC on how many or who has been trained, follow up training required, benefits of training, etc.</p>
<p><b>Output 4.2:</b> Technical knowledge of PV and PV/LPG systems will be strengthened.</p>	<p>70% of all technical training courses offered to vendors, dealers, technicians, etc. are completed.</p>	<p>RE Botswana has entered into a partnership with Local Enterprises Authority (LEA). LEA focuses mainly on identifying and training citizen entrepreneurs. LEA has already assisted in the recruitment of the first franchisee. Two other franchisees are being offered basic business skills.</p>	<p>S</p>

<p><b>Output 4.3:</b> The ability of the public sector and para-statal to provide a policy framework and assistance to further renewable energy-based rural electrification (notably PV) will be strengthened.</p>	<p>70% of all staff at EAD involved in renewable energy development has participated in at least one of the capacity strengthening activities offered through the project.</p>	<p>2 BPC technicians have been trained in PV courses. The trained technicians have assisted in offering courses country wide as trainers. EAD staff have been active in disseminating information on PV based lighting systems through Mobile Demonstration Unit displayed at at-least 4 major exhibition fairs.</p>	S
	<p>70% of all staff in the Off-Grid Electricity Unit at BPC has participated in at least one of the capacity strengthening activities offered through the project.</p>		<p><b>S:</b> More training necessary for project related staff.</p>
<p><b>Output 4.4:</b> An association looking after the business interests of the PV sector will be set up and is operational.</p>	<p>50% of all PV businesses are member of the newly formed association, possibly called 'PV Association of Botswana'.</p>	<p>No observable activities of SIAB, which PV dealers indicated is defunct. Expected secretariat not set up due to lack of funds and no funding from BPC or UNDP.</p> <p>Apparently no meetings have or are taking place. Two PV dealers indicated that SIAB is defunct. No major activities held. Possible chair indicated that they have no budget for setting up of a secretariat. Earlier expectation of receiving seed funding from UNDP or BPC did not materialize.</p>	<p><b>US</b></p>
	<p>The association meets at least 4 times per year and 2 major activities are implemented each year.</p>		
<p><b>Immediate Objective 5:</b> To assist with the development of appropriate financing mechanisms for the larger scale dissemination of PV-based technologies to rural customers.</p>	<p>The proposed subsidy disbursement scheme (as per Section IV-Part VII) is operational and functions properly.</p>	<p>Subsidy scheme was dropped very early in the project design in lieu of the fee-for-service model learned from the JICA pilot</p>	<p><b>US:</b> An end-user subsidy position paper has been developed by EAD and submitted to the PS. PS</p>

		project.	indicated it will be finalized by year end though it will be a challenge considering the National Electric Fund (NEF) also for grid-connection subsidy. Intended to reduce monthly fee of SHS from 70 Pula to 45 Pula. Subsidy may also be used for reducing the capital cost of the PV system. This action is highly desirable but taking too long to match with BPC Lesedi's roll out plan.
<b>Output 5.1:</b> A financing scheme to reach rural customers will be designed and implemented.	Financing schemes are operational so that rural customers can purchase subsidized PV-based systems during the 5-year project period via retail shops.		<b>US</b>
	A minimum of 50% of all PV purchases in the selected villages are being made using the financing scheme two years after introduction of that scheme.	No data available to assess this target. Field visits showed many large PV and solar water heaters on the roofs of Government facilities like councilors homes, teacher's quarters, etc. all of which purchased from major PV dealers like SIA.	Not rated.
<b>Output 5.2:</b> Sustainable (long-term) subsidy schemes for PV and PV systems will be designed and recommendations on how to implement these schemes will have been made.	Design and implementation strategies for subsidy schemes documented. This will be based on the proposed preliminary scheme presented in Section IV-Part VIII.	Pls see the rating box in the above row.	<b>US</b>
<b>Immediate Objective 6:</b> To disseminate experience and lessons learned to promote rapid implementation throughout the country of rural electrification based on renewable and low GHG technologies.	After Year 4 of the project, 1,500 PV		<b>US:</b> Not achieved. Only 242 SHS installed through May 2011.

<b>Output 6.1:</b> A program for replication of activities implemented under component 1 will be prepared.	systems per year are being sold outside the project area.		
<b>Output 6.2:</b> Lessons learned from the current pilot activities in three villages using fee-for-service with SHS will be documented and used for decision-making on possible continued developments with this delivery model.	Discussions (leading to decisions) on possible up-scaling and/or inclusion of the fee-for-service model in the renewable energy-based rural electrification plans/activities. These discussions will be initiated by the PMU before the 1 <sup>st</sup> year of the Project ends.	No discussion have taken place. Too early in the program to draw any lessons as the uptake of SHS has been extremely slow.	<b>US:</b> No progress to report.
<b>Output 6.3:</b> The impact of PV and PV systems in the project area will be evaluated.	Methodology for determining the impact of the project interventions exists and is applied. As impact monitoring is a guiding principle (see remark at the top of the logical framework matrix) this methodology will be designed ready for use in the 3 <sup>rd</sup> Quarter after the project has commenced.	Methodology developed and discussed in a workshop in 2010. Purchase of the required software delayed as the response to first tender was not responsive.	<b>US:</b> Relative to the target, significant delay affecting the quality of M&E.
<b>Output 6.4:</b> Support has been provided to disseminate the learning and replication experiences in the project area into the SADC region.	Experiences from this project will be shared with at least 3 countries in the SADC region before the end of the project.	Visits have been undertaken to South Africa, Namibia, Mozambique and Kenya. In South Africa, a concession-based approach packaged with subsidy on consumption; in Namibia, an outright purchase with optional private service contracts and a revolving fund;	<b>US:</b> No back to the office reports made available to ascertain what was learned or exchanged and how any experience was integrated into the project. No evidence of any discussion in project meetings.
	The experiences of at least three countries outside Botswana will be monitored and used to steer the Botswana project implementation and design future developments.		

	<p>At least three trips have been organized for a combined target group of Government and Donor representatives (both from inside and outside Botswana) to the project area to observe PV systems in order to learn and share experiences.</p>	<p>the Mozambique set-up is similar.</p> <p>The Swedish delegation that visited the pilot villages appreciated the use of the franchise approach and noted it as a possible best-practice.</p>	
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## Annex 8: Description of Previous Solar PV Projects in Botswana.

The Botswana Renewable Energy Technology (BRET) Project was in operation during the 1980's. The BRET project was jointly funded by the Governments of Botswana and the United States (through USAID). The scope of the project activities was to explore the potential for various renewable energy technologies for use in rural areas of Botswana. Technologies that were evaluated included:

- fuel conserving wood stoves
- retained heat cookers
- small scale water heaters
- renewable energy pumping systems (wind and PV pumps), and
- various applications of solar energy.

The use of PV technologies included: lighting and refrigeration in rural clinics (at Lentsweletau, Mabule and Shoshong), lighting in primary schools (at Oodi, Dishegwane, Shoshong and Molapowabojang) and PV water pumping (5 systems installed). The BRET project was also involved in the installation of approximately 25 anemometers throughout Botswana that resulted in the development of a wind map for Botswana.

In 1991, EAD started arrangements for a pilot project to install, monitor and evaluate solar energy technologies in the village of Manyana, which is located approximately 50 km from Gaborone. The Manyana PV project started in 1992 and was set up to assess the socio-economic viability of solar energy technologies so that they could be replicated in other parts of the country and to provide data to facilitate the formulation of policies regarding the use of renewable energy. In 1995, the project was changed from a pilot to a commercial project, managed by the Rural Industries Innovation Centre (RIIC). A credit scheme was offered to 42 users with instalment payments over two years. An evaluation of the Manyana project was carried out in 1994, during which 36 of the 42 users were interviewed. The following is noted from that evaluation:

- The users' highest priority item was for a refrigerator (64%), followed by televisions (61%), irons (36%) and Hi-fi/radios (31%).
- Fifteen percent of the households surveyed already had gas powered refrigerators.
- It was considered that a gas-powered refrigerator is a good complement to PV lighting since the investment in extra PV panels for a PV powered refrigerator can be prohibitively expensive.
- There is already an infrastructure for gas use since at least 85% of the respondents already used gas for cooking.
- Irons are often heated by gas or paraffin stoves.
- It was concluded that almost all households paid off their loans and were satisfied with the performance of their systems.

The National PV Rural Electrification Programme (NPV-REP) started in 1997 with the aim of disseminating PV electrification throughout Botswana after the successful implementation of PV in Manyana. The programme offered loans on nationwide basis to households and small businesses enabling them to purchase a SHS. RIIC was the implementing agency for the programme. Although the NPV-REP reduced the barrier of high up-front payments of SHS, the actual uptake remained low, with only approximately 300 SHS installed over four years. The following represent the key findings / limitations of the NPV-REP:

- The program was understaffed and the staff that was available was under-qualified.



- No proper system sizing method was used in preparation of quotations and there were inconsistencies in the pricing of quotations and considerable delay in the provision of quotations to applicants.
- System costs increased by fifty percent after inception of the programme.
- There was no adherence to the contracts signed between RIIC and the rural customers.
- Many systems were installed without down payments.
- Not enough pay-points were available where installments could be paid.
- There was a very high rate of defaulters.
- Systems were scattered over the country, which hampered maintenance efforts.
- There was no planned maintenance program to support periodic inspections.
- Customer service was poor.
- The accounting package and financial management system that were used in the program were not appropriate.
- There was no proper financial auditing of the project.
- Over half of the interviewees were not aware of the existence of the NPV-REP.
- There was no apparent complementarity between the Rural Collective Scheme (initiated to reduce the barriers for the uptake of grid electrification) and the NPV-REP.

The main restraining factors of the NPV-REP were summarised as follows:

- Unclear strategies on how to achieve target of 237 installations per year.
- Lack of adherence to policy procedures.
- Poor communication links between the implementing office and its clientele.
- Poor record keeping on payment status of end users.
- Rapid increase in component prices, which made total system costs very high.

A centralized PV system with a capacity of 5.5kWp started commercial operation in August 1998 in Motshegaletau Village. That system employs two inverters with an AC output of 4.5 kVA and supplies electricity to 14 customers through a 240 V distribution network with a length of approximately 2 km. Most of the electricity is supplied to a school, a clinic, the Kgotla (the village / tribal meeting place) and individual households. Two TVs, which were donated by a private company, were installed in the school and the clinic. Electricity is also supplied to streetlights. The electric tariff is P0.25/kWh (USD 0.05/kWh), which is the same as the Botswana Power Corporation (BPC) tariff. A combination of conventional and pre-paid metering systems is applied. Conventional meters were installed at nine households, with pre-paid systems installed at the remainder of the households. Cards with different values are provided with the pre-paid metering systems. No electricity fee is charged to public facilities, such as the school and the clinic, because the District Council pays for them. Three-day training sessions are provided to the District Council four times a year, which covers maintenance and repair of the system.

A project that provides users with solar lanterns and solar batteries is ongoing (even now? ) in the villages of Malatswae, Dimajwe, Majwana-adipitse and Tsimoyapula, all located in the Central District. The project is coordinated by the Serowe North Development Trust and is financed through the GEF-SGP. One hundred households obtained solar lanterns and batteries through a hire-purchase scheme with a down payment, and pay the remainder in monthly installments over a period varying between 12 and 18 months. The objectives of the project are to:

- Provide affordable high quality lights and solar batteries in a sustainable way to households in four villages.
- Build an institutional and financial framework based on the needs of the people that enables the execution of a solar lantern and battery hire-purchase scheme.
- Gain experience with a hire purchase scheme on a cost recovery basis.
- Encourage wider use of solar lanterns and batteries as a viable renewable energy source through replication in other villages in Botswana.

The solar lantern project is ongoing. Some initial findings are:

- There is a high breakage of solar panels of one manufacturer (solar panels of two different manufacturers were used in the project).
- Potential cost savings due to diminishing purchases of paraffin, candles, dry cell batteries and reduced charging of car batteries by solar lantern users, are on average not more than P30 (USD 6) per month per household.
- Having five different hire purchase schemes is unnecessarily complicated for users and administrators.
- Many users are behind with installment payments, probably due to insufficient incentives to pay installments and insufficient financial administration by the responsible people in the villages.

The following observations can be made regarding the implementation of this project:

- The implementing organization, Serowe North Development Trust, is potentially very well suited for distributing the lanterns because of its presence in the region.
- A well-organized system of fee collection, administration and after-sales service is required for a project of this type to be financially viable.
- Financial records are currently incomplete, incentives for fee collection at village level appear insufficient and the organization's response to complaints of users is slow or absent.
- Spare bulbs and in-house wiring should be locally available in the project area.