



**Terminal Evaluation of the UNEP/GEF Project
“Renewable Energy-based Electricity Generation
for Isolated Mini-grids in Zambia”**

Helene Rask Grøn and Nixon Chisonga

Evaluation Office

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Abbreviations

AEG	Advisory Expert Group
CEC	Copperbelt Energy Corporation
DBZ	Development Bank of Zambia
DoE	the Department of Energy (of Zambia)
EIA	Environmental Impact Assessment
ERB	Energy Regulation Board (Zambia)
GEF	Global Environmental Facility
GHG	Green House Gas
GRZ	Government of the Republic of Zambia
HIV	Human Immunodeficiency Virus
LFA	Logical Framework Approach
KW	Kilo Watt(s)
KWh	Kilo watt hour
KWp	kilowatt peak
MW	Mega Watt(s)
PDF	Project Preparation and Development Facility
plf	Plant load factor
PMU	Project Management Unit
POPs	Persistent Organic Pollutants
REA	Rural Electrification Authority (of Zambia)
RE	Renewable Energy
SAPP	Southern African Power Pool
ToC	Theory of Change
ToR	Terms of Reference
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organisation
UNZA	University of Zambia
ZEMA	Zambia Environmental Management Authority
ZESCO	Zambia Electricity Supply Corporation

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Pretoria, November 2014

I. Executive Summary

1. This report is the Terminal Evaluation of the GEF – funded UNEP project “Renewable Energy Based Electricity Generation for Isolated Mini-grids in Zambia”. The project was formulated in response to, and in support of, the Zambian National Energy Plan’s goal to increase rural electricity access from (the then) 2% rural population to 15% by 2010. The project’s global objective was “Energy related CO₂ emissions are reduced through promotion of environmentally sound renewable energy technology based mini-grids for rural electrification in Zambia”. The project document identified several formulations of the project’s main objective, but in general terms, the objective was to address key barriers to the deployment of renewable energy based mini-grids for rural electrification in Zambia. This was to be achieved through the following project components:
 - Designing and establishing legal, institutional and policy framework;
 - Building national and local capacities to promote renewable energy based mini-grids;
 - Planning and setting up innovative project financing mechanisms and structure;
 - Implementing pilot renewable energy based mini-grids to demonstrate business models;
 - Establishing project coordination and management structures and dissemination of information and lessons.
2. The project was implemented by the United Nations Environment Programme, Division of Technology, Industry and Economics (UNEP DTIE) with the United Nations Industrial Development Organization (UNIDO) acting as the executing agency. Key partners included the Government of Zambia, the Project Management Unit (PMU) comprising the Department of Energy (DoE) at the Ministry of Energy and Water Development, Zambia, Development Bank of Zambia (DBZ), Rural Electrification Authority of Zambia (REA), Zambia Electricity Supply Corporation (ZESCO), Copperbelt Energy Company (CEC), the Forestry Department of Zambia and Zambia Environmental Management.
3. The original budget was for 7.506 million US Dollars. This was made up of a Global Environment Facility (GEF) grant of US\$ 2.950,000, contribution by Government of Zambia of 1.256 million USD, UNEP/UNIDO contribution of 0.55 million USD and anticipated private sector investment of 2.75 million USD. The budget was revised twice to accommodate expenditure reallocations from delays and towards the extension of the project. The anticipated private sector investment did not materialise, however the co-funding from the Government of Zambia was higher than anticipated.
4. The project was initiated in 2006 and was designed to run for 5 years. Due to substantial implementation delays it was agreed by all partners to extend the project (budget neutrally) by one extra year. The project closed in December 2012.
5. This terminal evaluation was structured with a set of general questions related to achievement of project objectives followed by specific questions structured in line with GEF and UNEP criteria for ex-post evaluations, namely contribution to and achievement of: A: Strategic relevance; B: Achievement of outputs; C: Effectiveness: Attainment of project objectives and results; D: Sustainability & replication; E: Efficiency and F: factors affecting project performance. The evaluation approach used encouraged open-ended sharing of the most successful aspects of the project as well as aspects of the project which could have been improved.
6. The project was successful in engaging the Government of Zambia in the development of pilot mini grids. The establishment of these grids has received much attention and is felt to have contributed to the increase of awareness of the benefits, and practical knowledge of the mechanisms for developing Renewable Energy (RE) mini-grids. The Government of Zambia is now planning further development of both hydro and solar mini-grids as part of its national electrification programme. If successfully finalised, the revolving fund set up by the project will enable ongoing investment in RE projects in years to come.
7. All this was achieved despite considerable unanticipated problems such as the reluctance of the private sector to invest in RE, and a change of project manager midway through the project.
8. While the positive outcomes of the project and the flexibility and adaptive management skills of the project team are notable, the evaluation also notes that; several key project outputs were not achieved, some key adaptive management decisions were not documented, nor were the implications of these decisions

adequately considered. This led to some shortcomings in terms of stakeholder engagement (particularly of the private sector and community members), policy support and dissemination of information. For this reason, despite the considerable successes of the project, the overall rating is Moderately Satisfactory.

9. A summary of the project's performance in the key evaluation areas is discussed below. More detailed description and discussion is found in the main body of the report.

A Strategic Relevance

10. The evaluation finds that the project design was highly relevant to the climate change mitigation mandates of UNEP and GEF, to the aims of the Bali Strategic Plan and to Zambia's national priorities.

B Achievement of Outputs

11. With regard to the **planned outputs**, the project was successful in achieving the following:

- **Building national and local capacities to promote renewable energy based mini-grids:** Workshops, study tours and 'on the job' learning were used to build capacity of the main project partners.
- **Planning and setting up innovative project financing mechanisms and structures:** The project contributed funds to start up a revolving loan scheme for RE. This fund was used to provide loans to the three pilot plants. Some training was given to DBZ staff and the project team provided DBZ with assistance in the development of guidelines for implementation of the revolving loan scheme. However the full rotating loan mechanism was not yet finalised at project closure.
- **Implementing pilot renewable energy based mini-grids to demonstrate business models:** The project facilitated the construction of two pilot mini-grids and identified an investor for the third pilot. This was considerable achievement as the original plan to work with private sector was found to be unrealistic and the implementing of the pilot mini-grids was considerably delayed. The two plants which were constructed during the project life time were built by government agencies. However, no activities were implemented towards supporting productive end use of the electricity.
- **Establishing project coordination and management structures and dissemination of information and lessons:** Most project management and coordination structures were implemented as planned. Some dissemination of lessons to international stakeholders was carried out through the production of a brochure and a film after the project closure.

12. However, the following outputs that were indicated in the project document were not fully achieved:

- Designing and establishing legal, institutional and policy frameworks.
- Building capacity of private sector actors.
- Disseminating information and lessons to national stakeholders.

13. The reasons the project did not achieve these outputs stem from a combination of shortage of funds, a shortage of time and the result of some important adaptive management decisions. These are discussed fully in the main report.

C Effectiveness

14. With regard to the **planned outcomes**, the evaluation notes progress in the development of the following:

- **Strengthened enabling policy, institutional and legal environment for promotion of RE based mini-grids for rural electrification in Zambia:** Despite limited activity by the project in directly supporting legal, institutional and policy frameworks, the evaluation notes that there have been some positive developments, namely the revised National Energy Policy, this was however, developed outside this project with support of the Government of Sweden. The revised Policy contains a section on renewable energy. The evaluation notes that a number of outstanding policy issues remain, including:
 - Rural electrification strategy and budget for implementation
 - Pricing policy for mini grids
 - Detailed RE plan

- **Established national capacities for commercial deployment of RE technologies and RE based mini-grids:** The growth in capacity of the public sector is demonstrated by the fact that the key stakeholders, ZESCO and REA are engaged in developing further RE plants.
- **Financing of RE projects is facilitated:** The financing of the pilot projects has been facilitated by the provision of loans. Facilitation of further investment depends on the finalisation of the revolving loan fund.
- **Barriers constraining widespread use of RE technologies removed through provision of business models:** This outcome can be said to have been partially achieved through the successful completion of the two pilot mini-grids. The full achievement of this outcome depends on the technical, financial and institutional sustainability of these plants. Due to the time delay, these elements could not be assured by the end of the project life (see recommendations).
- **Existence of a replication and information strategy to promote renewable energy- based mini- grids on commercial basis in rural areas in Zambia:** As further discussed in section V (d), key stakeholders have developed a replication strategy for further RE plant development. An information dissemination process is not in place.

15. In terms of the project's global objective, the evaluation found some evidence of direct CO₂ reduction. The users of mini-hydro reported a decrease in the use of fossil fuels and electricity produced with the solar mini-grid replaced some burning of kerosene lamps and candles. The reduction of the use of firewood was marginal.

D Sustainability and Replication

16. The evaluation finds that sustainability of the project outcomes is not yet guaranteed. This is largely due to the delay in implementation, which meant pilot plants, and the rotating fund were not fully finalised and functioning at the end of the project life.
17. Nevertheless, the project was found to have a high level of national ownership - reflecting its high strategic relevance. The extent of ownership and national pride in the project was demonstrated by the fact that President of Zambia was present at the commissioning of both the hydro and the solar mini-grids. Key project partners, ZESCO and REA now plan to commission further mini grids. Thus the project can be said to have had a catalytic effect, contributing to the increasing awareness, interest and commitment to RE by the Zambian government.

E Efficiency

18. The project was significantly delayed to the extent that despite one year extension, only one pilot project was established before closure of the project. The evaluation found little evidence of active action taken to improve the efficiency of the project or to compensate for delays. However, some adaptive management decisions, such as the decision to engage the Government when private sector partnerships were found not to be feasible improved the project's efficiency.

F Factors affecting performance

F (i) Preparation and Readiness

19. Project design was found to be unclear in terms of expected results and overly optimistic in terms of duration, resources and results to be achieved. Discussions to establish the project were initiated in early 2000 and the project was officially initiated in December 2006. Due to the time lag between project design and implementation, the changing national context and lack of clear understanding and realistic budgeting by the design team, not all outputs could be achieved within the budget and time frame. Several elements that need to be in place for RE mini-grid development, such as land rights, water rights, environmental approvals, connectivity charges, tariffs, payment structures, sale of electricity, maintenance and installation logistics were not adequately thought through. The evaluation notes that the use of an inception workshop, to update and ground-truth assumptions made in project design would have added considerable value to the project.

F (ii) Project implementation and management

20. With regard to factors affecting performance, the evaluation notes that the project team responded effectively to the changed national context and unexpected barriers encountered. For example, when it was found that the private sector were not yet ready to invest in RE, the project team negotiated with government agencies to take on this role. At a later stage, when one of these agencies withdrew from the biogasifier mini grid pilot, the project team were able to find a private investor to take on the role. This flexibility and adaptive management resulted in the project making a significant contribution towards its global objective, despite the fact that several key outputs and outcomes (as stated in the project document) were not achieved.
21. Weaknesses of the project implementation, which reduced its overall evaluation rating included shortcomings to adequately engage some key stakeholders (most importantly local community members), the shortage of technical expertise in the core team (following the decision to cut the post of RE technical specialist) and the cancellation of some key activities such as stakeholder awareness meetings and formation of the planned Advisory Expert group. The project performance would have been enhanced if these aspects had been stronger.
22. The evaluation notes that while the adaptive management strategies adopted by the project team were extremely effective, the failure to document these through project document revisions, as well as non-documentation of key activities (e.g. outcomes of study tours) have created a lack of accountability which has reduced the overall rating of this project.
23. The project made extensive use of south-south exchange, supporting study tours and exchange of information and on the job capacity building between Zambian stakeholders and relevant organisations in China, India, South Africa, Columbia, Brazil, Mexico and Senegal.

F (iii) Stakeholder participation and public awareness

24. Participation of the key stakeholders: ZESCO, REA and DBZ was good. However, other key stakeholders, notably community members and the private sector were engaged to a very limited extent¹. The role of engaging stakeholders was a key role of the planned AEG but the AEG was never formed.

F (iv) Country ownership and drivenness

25. As noted above, country ownership in this project was high, demonstrated particularly by the high level of co-funding provided by the national partners. The co-funding eventually enabled the construction of the mini-grids.

F (v) Financial planning and management

26. Financial reports were delivered on time and their quality was satisfactory. The evaluation found that a large proportion of the budget was spend on project management, staff costs and office expenditures, whereas limited resources were allocated to undertake the barrier removing activities listed under the components 1, 2, 3, and 4. Due to the delays in implementation of the pilot mini-grids, the funds transferred to the biogasifier have not been spent but held by the DBZ in anticipation of use for the biogasifier and then to be paid back and used for on-lending in a revolving fund.

F (vi) UNEP supervision and back stopping

¹ A number of incidences of community engagement were observed. For example, the traditional leader in Shiwangandu (Chief Mukwikile) spoke strongly for the project and was part of the team that made representation to the government and other partners on the benefits of the project to the people of Shiwaangandu. Chief Mukwikile together with Mark Harvey, the private Lodge Owner were part and parcel of the developments of the Shiwangandu hydro mini grid. At the time of our visit, the communities had also changed the nature of houses to suit the standard condition ZESCO had prescribed for them to access electricity. At the solar mini grid, the project staff/REA conducted some community sensitization events.

27. Project team members reported satisfaction with supervision and backstopping from both UNEP and UNIDO. It was noted that UNEP, in particular, provided technical input during the design and procurement phase for the mini-grids. The project partners all expressed satisfaction with the inputs. Delays in implementation affected UNEP's ability to fulfil its' role in backstopping since only the hydro mini-grid was completed when the project was still ongoing. Establishment of the solar mini-grid took place after the formal project closure and the biogasifier had not been implemented at the time of the evaluation.

F (vi) Monitoring and Evaluation

28. Though monitoring plans met UNEP/UNIDO standards, the evaluation notes that there was a lack of baseline data for the key indicators and that some of these indicators were not SMART². Implementation was carried out according to the schedule but did not highlight adaptive management decisions (which remained undocumented). The Mid-term Review (an obligation for GEF full sized projects) was cancelled.

29. The overall rating for the project is shown in the table 1 below.

Table 1. Summary of evaluation ratings

Criterion	Ratings	EO ratings (if different)	UNIDO Rating
A. Strategic relevance	MS		MS
B. Achievement of outputs	MU		MS
C. Effectiveness: Reach objectives and results	MU		MS
1. Achievement of direct outcomes	MU		MS
2. Likelihood of impact.	MU	MS	MS
3. Achievement of project goals and planned objectives	MU	MS	MS
D. Sustainability & replication	ML		L
1. Financial	ML		ML
2. Socio-political	ML	L	L
3. Institutional Framework.	ML		ML
4. Environmental	L		L
5. Catalytic role and replication.	L		L
E. Efficiency	MU		MS
F. Factors affecting performance.			
1. Preparation and readiness	U		U
2. Project implementation and management	MU	MS	S
3. Stakeholders participation and public awareness	U	MU	MS
4. Country ownership and drivenness	S		S
5. Financial planning and management	MS		
6. UNEP supervision and backstopping	MU		MS
7. Monitoring and evaluation	MU		MS
a. M&E Design	U	MU	MU
b. Budgeting and funding for M&E activities	MU		MS
c. M&E Plan Implementation	MU		MS
Overall project rating	MS	MS	MS

Key Lessons from the Project

30. Based on the Evaluation findings summarised above, the evaluation has identified some successes and challenges the project has encountered and formulated these as lessons in order to promote learning for future similar initiatives. The key lessons derived from this project are listed below.

² SMART: Specific, Measurable, Attainable/Attributable, Relevant, Time-bound.

31. **Lesson 1: Rural electrification project design should draw on relevant experience in rural electrification, lessons from past projects as well as context specific analysis of stakeholders and baseline information.** The experience of this project is that project design was overly optimistic and could have been improved by the following:
- a) Understanding the complexity of rural electrification processes and learning lessons from similar projects. This will contribute to more realistic risk analysis and estimates of required time and budget requirements.
 - b) In depth stakeholder analysis, and planning and budgeting of activities to engage key stakeholders.
 - c) Collection of baseline information to define SMART indicators for project outcomes.
 - d) Development of a clear theory of change, presented in a way which can be shared and understood by key stakeholders.
32. **Lesson 2: When there is a delay between design and implementation, a project inception workshop is essential to ensure that planned activities, budget and timeframe are still relevant.** The inception phase is the time when the project implementer can host workshops and solicit views, requests and ideas from a broad group of stakeholders. If a project can secure stakeholder support then shortcomings in design can be overcome because there will be some momentum from the legislature, the private sector, the universities and the NGOs who might have access to additional and different resources and thus contribute to a greater achievement of the outcome. This is particularly important when, as was the case for this project, there is a delay between design and implementation.
33. **Lesson 3: Community participation in mini-grid development should be fully integrated right from the conceptualisation stage.** The evaluation notes that greater community participation would have contributed to greater project success in financial and institutional sustainability and progress towards impact. See discussion in section B, Achievement of outputs, para 92 and achievement of impact para 127 and Section D, Sustainability and Replication.
34. **Lesson 4: To ensure financial sustainability, electricity should be treated as a commodity and priced accordingly.** The two pilot projects applied distinct approaches to household connection. The experience showed that clear pricing up front is more effective than providing electricity free and introducing payment at a later stage.
35. **Lesson 5: The amount of dedicated technical input needed for RE development should not be underestimated.** The shortage of core technical staff (discussed in the section on project implementation, was a key factor why the project did not achieve all of its planned outputs. It is important that the technical requirements of projects are clearly assessed and these requirements matched with adequate project staff capacity.
36. **Lesson 6: Systematic Monitoring and Documentation of adaptive management decisions is essential in projects.** If the monitoring had been better designed and implemented (so that the implications of adaptive management decisions were fully discussed and compensatory measures taken when necessary), the overall performance of this project would have been improved. Effective monitoring is of particular importance in this type of project because of the rapidly changing environment and large number of stakeholders, which are likely to require high levels of adaptive management. In addition to its importance for project management, documentation of adaptive management decisions is essential for accountability purposes. Failure to document changes in strategy result in the project being penalised for not meeting the outputs planned in the project document, as has happened in the case of this project. Effective systematic monitoring and documentation provides learning and assists in making timely changes during implementation of the project.
37. **Lesson 7: Collaborate with influential community actors.** Projects would benefit from working with local District and Community-level bodies (or forming these where they are non-existent) that should include community leaders such as traditional leaders, religious leaders, civic leaders and NGO and CBO based leaders to coordinate activities of rural electrification to encourage greater uptake, willingness to pay, and other productive end use of the project.
38. The Evaluation provides the following **Recommendations:**

39. **Recommendation 1:** It is recommended that UNEP requests UNIDO and former national project counterparts to engage with the Copper Belt Authority to ascertain the likelihood that the biogasifier project will materialise and to provide technical support if needed for this process. It is very important to decide what to do with the funds that have been released and are being held by the DBZ, in the event that the plant is not built.
40. **Recommendation 2:** The plan to convert the mini-grid grants to soft loans for repayment and continued on-lending have not yet materialised. While REA and DBSA both acknowledge that there have been discussions to establish a revolving fund and draft documentation has been prepared, the fund was not established by the end of the project and it has still not been established by March 2014. UNEP should ensure that this issue is followed up or should request UNIDO to do so.
41. **Recommendation 3:** It is recommended that UNEP requests former national project counterparts to provide support in ensuring the existing mini-grids to attain financial and technical sustainability, and to support GOZA in the development of key policy areas which still remain to be addressed (see para 69):
- Rural electrification strategy and budget for implementation;
 - Pricing policy for mini grids.
 - Renewable electrification plan.

II. Introduction

Table 2. Overview of Project Facts

GEF project ID:	1358	IMIS number:	GFL-2328-2721-4899
Focal Area(s):	Climate Change	GEF OP #:	OP 6 ³
GEF Strategic Priority/Objective:	CC 3	GEF approval date:	17 November 2005
UNEP approval date:	25 April 2006	First Disbursement:	May 2006
Actual start date:	December 2006	Planned duration:	5 years
Intended completion date:	December 2011	Actual or Expected completion date:	December 2012
Project Type:	FSP	GEF Allocation:	\$ 2,950,000 million
Expected MSP/FSP Co-financing:	\$ 4,556,000	Total Cost:	\$7,506,000
Mid-term review/eval. (planned date):		Terminal Evaluation (actual date):	2013
Mid-term review/eval. (actual date):	Not carried out	No. of revisions:	3
Date of last Steering Committee meeting:	December 03 2012	Date of last Revision:	19 June 2012
Disbursement as of 30 June 2013	2,936,600	Date of financial closure:	n/a
Date of Completion:	December 2012	Actual expenditures reported as of 30 June 2013	2,923,379.89
Total co-financing realized as of 31 December 2013:	6.298.457.10	Actual expenditures entered in IMIS as of June 30 2013	2,925,019.74

³ OP 6 'Promoting the adoption of renewable energy by removing barriers and reducing implementation costs'

III. The Evaluation

42. This report is the Terminal Evaluation report of the UNEP/GEF project “**Renewable Energy Based Electricity Generation for Isolated Mini-Grids in Zambia**”. The project was officially completed at the end of 2012 after two extensions. The evaluation has been executed as part of a regular and mandatory feature for all UNEP projects. The objective of the terminal evaluation, undertaken one year after completion, was to assess project performance (in terms of relevance, effectiveness and efficiency), determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability and assess how different factors and processes along the project’s design and implementation phases have affected the project delivery (see the evaluation ToR in Annex 1). The evaluation had two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UNEP, the GEF and their partners. The evaluation took a forward looking approach and identified lessons of operational relevance for future project formulation and implementation.
43. This terminal evaluation was structured with a set of general questions related to achievement of project objectives (as stated in the project document). These questions were:
- a) *Did the project achieve its aim of contributing to the creation of a stronger legal institutional and policy framework to support renewable energy based mini-grids in Zambia?*
 - b) *To what extent did the project succeed in building national and local capacities to promote RE based mini grids?*
 - c) *Was the project successful in creating a sustainable funding mechanism to promote investment by PPI in renewable energy?*
 - d) *To what extent did the project succeed in its aim of establishing three pilot mini-grids to demonstrate the technical and financial viability of using renewable energy technologies for rural electrification?*
 - e) *Overall, how successful was this project in meeting its goal of reducing barriers to the use of renewable energy technologies for rural electrification in Zambia?*
44. The third and last part of the questions allowed for open ended sharing of the most successful aspects of the project as well as aspects on which the project could have been improved.

Evaluation methodology

45. An inception report was finalised on the 28th October 2013 and followed by desk review of the documentation submitted by the Project. A visit to Zambia took place from the 3rd – 12th November 2013 where key project partners and stakeholders were interviewed. The pilot site for solar mini-grid and the site for hydropower mini-grid were also visited and the communities and mini-grid owners interviewed. Upon review of the draft evaluation report UNIDO and UNEP agreed on a need to collate and provide further evidence to the evaluation of achievement and information sharing activities. In early April 2014 these additional reports and material were submitted to the evaluation team and subsequently the evaluation report was revised based on the additional material provided.
46. The evaluation programme is attached in Annex 4 and a generic list of documents consulted and stakeholders interviewed is attached in Annex 5.

IV. The Project

A. Project background

47. The “Renewable Energy Based Electricity Generation for Isolated Mini-Grids in Zambia” project was officially initiated in December 2006 after extensive preparation efforts over a period of two years. Initial project discussions started in the early 2000 with the implementation of a PDF-B. The project was formulated in response to and in support of the Zambian National Energy Plan’s goal to increase rural electricity access from (the then) 2% rural population to 15% by 2010. The aim was to increase electrification in a sustainable manner thus contributing directly to reduction in GHG emissions.

48. Zambia has abundant supply of hydropower and hydropower provided more than 94% of the 1,170 MW power consumption in Zambia in 2005. Zambia also had excess power (hydropower) which was exported to neighbouring countries. The export was facilitated via the Southern African Power Pool (SAPP). Despite this abundant hydropower resource availability and even export, only 44% of the urban population had access to electricity at the time of formulating the project. In rural areas the connectivity stood at 2.2% in 2008⁴.
49. Inevitably, Zambia's over dependence on hydropower makes the electricity system vulnerable to the impacts of droughts⁵ and years of dry spells⁶. In addition, it is expected there will be increased electricity demand as the country expands its economic activities. A combination of these factors necessitates diversifying the energy resource options in light of the attendant barriers⁷. The barriers preventing a better utilisation of available resources included cost structures for electricity and the long distances involved in transporting power to rural areas that relatively speaking had too little demand to justify grid-connectivity. Additional barriers included the absence of legislation to facilitate the establishment of local mini-grids; weak skills base for maintenance and installation and management of available energy options, including insufficient information about energy options. Given the low power grid access and the abundant availability of renewable energy in rural areas, the options to enhance national energy security in Zambia would invariably include integrated energy policy planning, strengthening of key institutions, diversifying the energy supply by including locally-available renewable resources, and actively involving local communities and private sector focusing mainly on income generation activities.
50. This overall country energy context with low penetration of power grid in the rural areas only leaves generation of electricity through diesel gensets as alternatives and clearly presented an ideal opportunity for GEF to intervene, using abundantly available resources in Zambia: Hydro, Solar and Biomass.

51. Table 3. Project milestones and key dates

Project actual start date	May 2006
Project implementation 2006	No evidence of milestones
Project implementation 2007	The project team was selected
Project implementation 2008	Detailed feasibility studies for the mini-hydro and the bio-gasifier
Project disbursement	First disbursement May 2006
Project planned completion date	March 11; December 2011; February 2012
Project operational completion date	December 2012

B. Project objective(s) and components

52. The project's global objective as stated in the project Logical Framework ("*Planning Matrix*") was "Energy related CO² emissions are reduced through promotion of environmentally sound renewable energy technology based mini-grids for rural electrification in Zambia". The project document states several variations of the projects 'main objective'. The project document summary states the main objective as "to demonstrate, through the pilot mini-grids, the technical and financial viability of using renewable energy resources for rural electrification to potential investors, financing institutions, the utility, equipment suppliers, energy service providers, and government planning and regulatory officers". The main text of the project document states the project's main objective as "to address key barriers to the deployment of renewable energy based mini-grids for rural electrification in Zambia". The main text of the project document then further lists five 'immediate objectives' of the project, the first one being the statement introduced in the project document summary as the project's 'main objective', and the four other ones stated as (i) "to demonstrate, through the pilot mini-grids, the IPP and BOT business models for utilizing each of the three

⁴ Energy Regulations Board (ERB) Report, 2012

⁵ Kandji S T, Verchot, L and Mackensen, J 2006. *Climate Change and Variability in Southern Africa: Impacts and Adaptation in the Agricultural Sector*. Nairobi: UNEP/ICRAF

⁶ Yamba, F. D., Walimwipi, H., Jain, S., Zhou, P., Cuamba, B. and Mzezewa, C. 2011. 'Climate change/variability implications on hydroelectricity generation in the Zambezi River Basin', *Mitig Adapt. Strat. Global Change*, 16: 617–628.

⁷ Tembo, B., and Merven, B., 2013. Policy Options for the Sustainable Development of Zambia's Electricity Sector, *Journal of Energy in Southern Africa*, Vol. 24, No 2

renewable energy sources in rural electrification”; (ii) “to set up a public/private project financing mechanism to entice investors”; (iii) “to establish a legal, institutional, and policy framework to provide favourable environment for commercial deployment of renewable energy based mini-grids in rural areas of Zambia”; and (iv) “to build national and local capacity for commercial deployment of renewable energy based mini-grids in rural areas of Zambia”. The project had five components, also referred to as “outputs” or “activities” in the project document) as listed in Table 2 below. According to the project document, each ‘activity’ or rather a component was composed of an immediate objective (also defined as an outcome in the project’s planning matrix), specific outputs and a number of sub-activities.

Table 2. Project components and outcomes.

Component	Outcome
1) Designing and establishing legal, institutional and policy framework	Strengthened enabling policy, institutional and legal environment for promotion of renewable energy based mini-grids for rural electrification in Zambia.
2) Building national and local capacities to promote renewable energy based mini-grids	Established national capacities for commercial deployment of renewable energy technologies and RE based mini-grids to meet rural energy needs in Zambia.
3) Planning and setting up innovative project financing mechanisms and structures	Financing of RE projects for rural electrification is facilitated.
4) Implementing pilot renewable energy based mini-grids to demonstrate business models	Barriers that constrain wide spread use of renewable energy technologies in rural areas removed.
5) Establishing project coordination and management structures and dissemination of information and lessons	A replication and information strategy to promote renewable energy- based mini- grids on commercial basis in rural areas in Zambia in place.

53. Although the proposed activities focused on addressing barriers and promoting investment projects for renewable energy based mini-grids at three different locations, replication activities were to be designed for the implementation of similar projects in other parts of Zambia as well as in the Southern African region in general⁸.
54. The project document highlights the private sector as the key investor target group and local communities especially women groups as the prime ultimate beneficiaries. The project document highlights that, at every stage of project implementation, local communities (especially womens groups) were to be involved to ensure sustainability and local ownership of the project.
55. GHG Emission Reductions were of key importance and it was assumed that:
- a) With a 1,000 kW biomass gasifier (planned for Kaputa) plus mini-grid (generation capacity at 75%) the amount of CO₂ saved annually would vary between 5,400 and 6,900 tonnes. Assuming an average value, the annual CO₂ savings were expected to be 6,200 tonnes.
 - b) At Shiwang’andu a hydro mini-grid would be built. Based on the seasonal availability of water, it was expected that up to 6.6 million units kWh would be generated annually. This would replace 188,571 litres of diesel (assumption: 1 litre of diesel emits about 3.2 kg of CO₂) thus saving about 6,200 tonnes of CO₂ annually.
 - c) At Samfya solar mini-grid for 36 kWp and a plf of 16-21 % it sums up to 36 kW x 8,760 hrs/year x 0.21 (availability) = 66,225 kWh. Diesel saved is then 18,921 litres, amounting to CO₂ saved 18,921 x 3.2 = 60 tonnes. Annual savings of CO₂ from all three mini-grids sums up to around 12,500 tonnes/a. Total abatement of CO₂ during the service life would come to about 220,000 tonnes (Mini-Hydro and Solar PV lifecycle assumed at 20 years and biomass mini-grid at 15 years).

⁸Project document description of target group.

C. Implementation arrangements

56. UNEP was the Implementing Agency, whose role was to oversee the project while UNIDO as the Executing Agency was to execute all project activities. The Department of Energy (DoE) under the Ministry of Energy and Water Development was the national counterpart agency with overall ownership and responsibility for guiding the implementation of the project at the national level. The DoE was to closely coordinate with UNEP and UNIDO for the timely execution of the project activities. The Development Bank of Zambia (DBZ) (a national level financial and banking company to fund developmental projects in Zambia) was to assist in managing the Risk and Replication Management Fund (RRMF). UNIDO was to set up a Project Management Unit (PMU) expanding the existing national field office to coordinate and execute the project activities. The Project Coordinator who would be appointed by UNIDO was to report to both DoE and UNIDO for good coordination and timely implementation of the project activities.
57. A Project Steering Committee (PSC) was to be set up to oversee the project implementation under the chairmanship of the Permanent Secretary (PS) of the Department of Energy in Zambia. This Project Steering Committee would comprise of members drawn from the key Government departments and agencies (including Ministries of Energy and Water Development, Environment, Finance and Industry), Rural Electrification Authority (REA), Energy Regulation Board (ERB), local administration, financial community, public utility, civil society and the private sector. The Department of Energy (DoE) was to approve and notify the PSC, which among other things, would also advise on inter-ministerial coordination and cooperation, besides serving as a platform for sharing information on the project's progress. At the end of the project, this committee was also vested with the responsibility on deciding on follow up action. A small group comprising of DoE, DBZ and UNIDO/UNEP was to serve as the decision making body (Advisory Committee) for the RRMF proposed under the project and subsequent setting up of a revolving fund.
58. An Advisory Expert Group (AEG) comprising of experts and other key stakeholders including local administration, NGOs and local industrial organizations was also to be established. The AEG was to be responsible for the replication and coordination of the project activities. This AEG's role was to facilitate public participation in the implementation phase and ensure local ownership of the project through information dissemination on a regular basis. The AEG was also to ensure that all key decisions on location of various facilities under the proposed project were taken after taking into account inputs provided by public representatives, NGOs and local industrial associations. The AEG was to assist the PSC at every stage including mainstreaming gender issues into project activities by involving women groups in decision-making processes at every stage.

D. Project Finance

59. The original budget, of 7.506 million US dollars, comprised a GEF grant of US\$ 2,950,000, contribution by the Zambian Government of US\$ 1.256 million, UNEP/UNIDO contribution of US\$ 0.55 million and anticipated private sector investment of US\$ 2.75 million. The budget was revised twice to accommodate expenditure reallocations caused by delays. The budget was spent in full as can be seen from the expenditure report attached in Annex 4. There was a substantial co-finance above US\$ 6 million (the project document estimated US\$ 4,556,) from the mini-grid owners (See Annex 4).
60. The evaluation team noted that the project completion report did not include a project expenditure completion report but this information was submitted to the evaluation team early 2014 and all funds are accounted for in line with UN regulations.

E. Project Partners

61. The key partners included the following institutions: The Government of Zambia; The Project Management Unit (PMU) comprising DoE at the Ministry of Energy and Water Development, Development Bank of Zambia (DBZ), REA, Zambia Electricity Supply Corporation (ZESCO), Copperbelt Energy Company (CEC); the Forestry Department of Zambia (biogasifier site), and Zambia Environmental Management. Other stakeholders included; potential investors, financing institutions, equipment suppliers (ICSHP), energy service providers, communities at mini-grid sites and donor organisations, the University of Glamorgan and the University of Zambia.

F. Design changes during project implementation

62. There were a number of changes to planned project activities.
- a. Project staffing was envisaged to include:
 - i. A National Project Coordinator (seconded by GRZ) position was changed to be funded by UNIDO.
 - ii. An International Renewable Energy Technical Specialist – funded by UNIDO. This position was cancelled and replaced by funding the Project Coordinator from the project.
 - b. Pilot projects: it was envisaged that three pilot projects should be implemented. The initial plan had been to work with the private sector. When this proved impossible, the project engaged instead with REA and ZESCO to implement the plants. In 2011 ZESCO withdrew from the Biogasifier and after intense negotiations it was agreed that the CopperBelt Energy Company (CEC) would take over the implementation of a Biogasifier with use of the funds provided but as an activity outside the scope of the Project under evaluation⁹.
 - c. Project monitoring-review. A mid-term review should have been implemented according to the Project Document¹⁰ and is obligatory for GEF-funded full sized projects. The reason given for its cancellation was that there was no remaining budget to cover the activity and that the project team felt that the project was on course to succeed and that no changes were needed after the adaptive management actions taken to re-scope the project according to the time and funds available for the second half of the project¹¹.
 - d. The planned Advisory Expert group was not formed.
 - e. Project completion: the project completion date was shifted twice from the original closure date in mid-2011. The first move was a result of the late initiation of the project and the later extension was a result of the slow but improving progress. A budget neutral extension to the end of 2012 was agreed by the PSC in 2011¹².

G. Reconstructed Theory of Change (ToC)

63. The Theory of Change Diagram shown below visually represents the desired progress from project outputs towards impact. Outputs shown are based on the components, outputs and outcomes in the project document. In addition the evaluation team have inserted necessary 'intermediate stages' which would be expected to occur as progress is made towards the desired project objective and impact. The drivers and assumptions, which if in place, support progress towards impact are also shown in the diagram. The reconstructed theory of change was used to guide the evaluation and to carry out the review of progress from outcomes to impact described in section D of the evaluation findings.

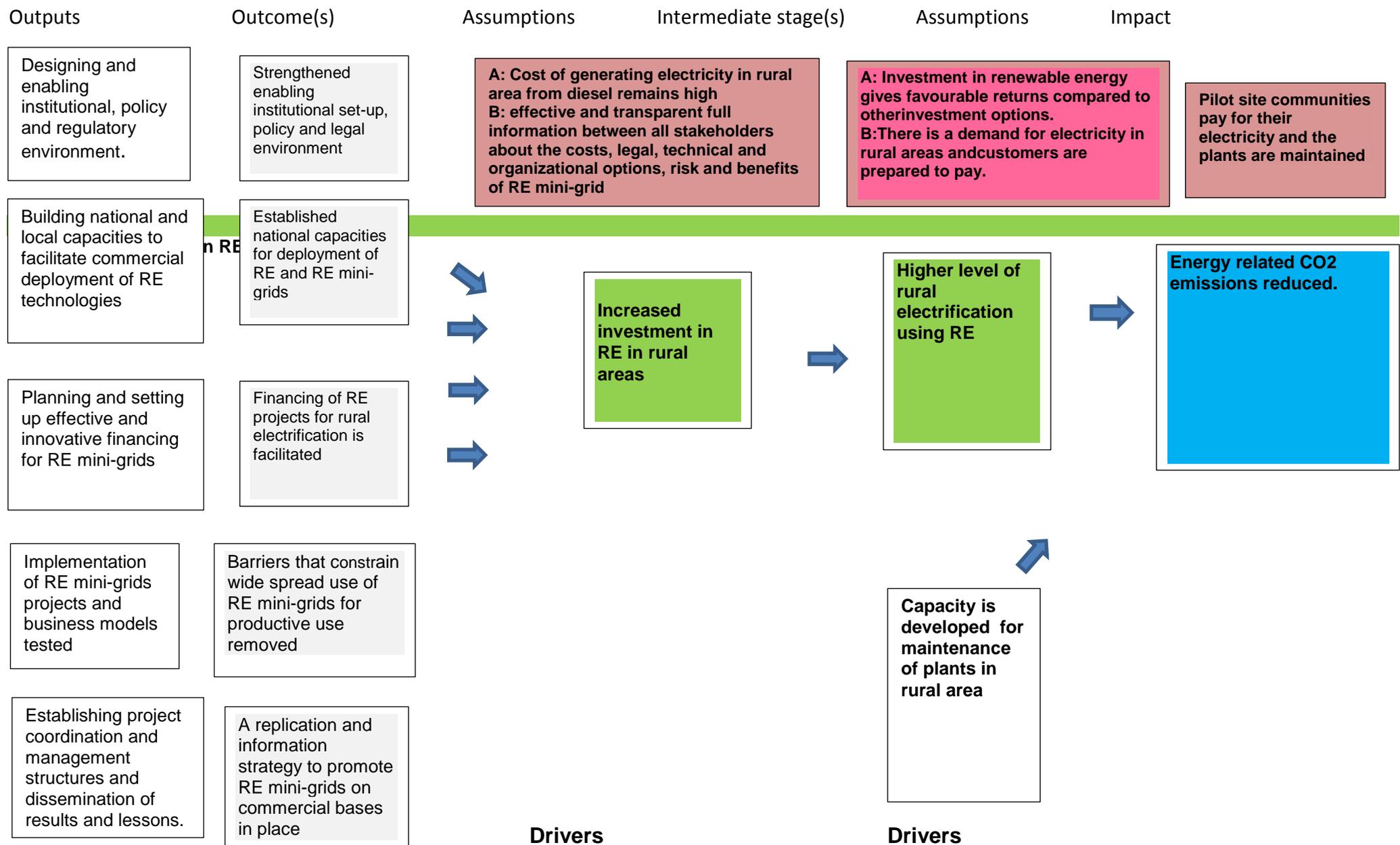
⁹Final Project Report UNEP-GEF July 2012-June2013

¹⁰ Project document p 51, para 185

¹¹ communication with project manager

¹²PSC Minutes 2011 and 2010)

Figure 1. Reconstructed Theory of Change



V. Evaluation findings

A. Strategic relevance

Relevance to Sub-Regional environmental issues

64. Zambia's environmental priorities related to energy remain to promote optimal supply and utilisation of energy for socioeconomic development in a safe and healthy environment through sustainable forest and other natural resource management solutions. There is also recognition that energy is cross-cutting and must drive critical social sectors like health, education, transport and commerce. Energy provision takes into account issues of poverty, HIV and AIDS, gender, environment, household energy needs, rural electrification, and the role of bio-fuels in Zambia's future energy mix. The electrification rate in Zambia is 3% and the target has been set for 30% electrification in 2030. Renewable energy mini-grids are one of the options to increase the electrification rate. The two pilot sites of Shiwang'andu mini-hydro and Mpanta solar mini-grid attest to these priorities. Deforestation is the main sub-regional environmental issue related to energy provision. The project intended to provide renewable energy to contribute directly to the measurable reduction in use of fuel wood. There is evidence of the sub-regional strategic relevance in the pilot project. However, it has been documented in the baseline study for the mini hydro power grid (September 2011) that newly electrified households initially acquired electrical gadgets for lighting followed by those for entertainment such as television sets and radios before thinking of refrigerators and maybe at a later stage would electrical kettles come in but not necessarily electrical stoves¹³. This suggests that fuel wood remains a cheaper energy option for cooking by households both in rural and urban areas for years after electrification¹⁴. It may require longer term systematic measurement to observe a reduction in fuel wood use through the introduction of this renewable energy project. The evaluation found no evidence of any reduction in the consumption of fuel wood for cooking from any of the pilot projects. At the local level, the pilot projects, however, did show decreased use of candles and kerosene as well as diesel for generators contributing towards reduction of GHG emissions and negative impacts of climate change.

Relevance to UNEP

65. The UNEP¹⁵, was established in 1972, and functions as the voice for the environment within the United Nations system. UNEP acts as a catalyst, advocate, educator and facilitator to promote the wise use and sustainable development of the global environment. UNEP's main work encompasses: assessing global, regional and national environmental conditions and trends; developing international and national environmental instruments; and strengthening institutions for the wise management of the environment.
66. Relating the UNEP mandate to the project it is noted that the project document places strong emphasis on the overall objective of reduction of GHG emissions. It is also noted that the four components related to capacity building for strengthening institutions for the establishment of RE which could lead to better management of the environment.
67. The project's work in strengthening the capacity of the Zambian government to address their needs, priorities and obligations in the field of the environment is highly complementary to the aims of the Bali Strategic plan.

Relevance to GEF

68. As the objective of the project is to reduce CO₂ emissions, the project is of high relevance to GEF's climate change mitigation aims: *"Reducing or avoiding greenhouse gas emissions in the areas of renewable energy; energy efficiency; sustainable transport; and management of land use, land-use change, and forestry (LULUCF)"*.

¹³See also the Baseline report from the mini-hydro project

¹⁴IEA: "emerging market rural electrification study" 2010 + DoE South Africa Rural Electrification Surveys. See also Chisonga (2013) Fuel Wood Energy Use in Zambian Cities: Charcoal and Firewood Movements.

¹⁵www.unep.org

69. Overall the evaluation finds that the project rationale is well aligned with national, regional as well as UNEP and GEF mandates for support towards reduction of GHG emissions and negative impact of climate change. However, the project was implemented as a one-country pilot without a clear strategy how to communicate the project's results and to promote uptake of the findings to establish renewable energy mini-grids in other countries. Based on this assessment, the rating of the strategic relevance is **Moderately Satisfactory (MS)**.

B. Achievement of Outputs

70. The evaluation of the "achievement of outputs" assessed, for each of the five components, the project's success in producing the outputs as they were described in the project document and possible subsequent amendments. The evaluation has tried to assess the achievements both in quantity and quality, as well as their usefulness and timeliness based on review of the project progress reports and interviews with the Project's Task Manager, Project Manager and relevant stakeholders.

Output 1: Designing and Establishing Legal, Institutional and Policy Framework consisting of the following activities:

- **Evaluate and design policy/regulatory framework.** It is noted that the project hosted a two-day workshop on renewable energy policies and finance with a two hours of technical input from an international technical expert. It is also noted that UNIDO has reference documents on renewable energy policies produced outside the auspices of this project. The stakeholders interviewed in Zambia share the view that the project did not fully contribute to evidence based design of a policy for rural or renewable electrification or to revision of any regulations. There are, for example no reports evaluating the existing policy or existing regulations or documents from the project analysing and recommending specific regulatory changes¹⁶.
- **Set up a renewable energy cell at DoE.** It is noteworthy that DoE, like many other Government Departments across the country, is challenged by human resources capacity due to attrition. The number of staff employed in the Renewable Energy Division has not been consistent over the years. Interviews with representatives from the DoE indicate that there was no renewable energy cell in existence in November 2013, at the time of the evaluation visit to Zambia. The evaluation team was informed by the DoE that there was one staff member working with Renewable Energy. However, according to UNIDO, the DoE had eight members employed in the Renewable Energy Divisions¹⁷. However the evaluation was unable to find clear information to confirm the existence of this cell.
- **Prepare and disseminate quality assurance standards on RE technologies.** It is noted that members from the Bureau of Standards participated in a workshop and a study tour. The evaluation found no indications of mapping of relevant quality assurance standards and plans for possible adjustments prepared by the Project. The evaluation team can thus not conclude that the project provided input to deliver this activity and the Bureau of Standards, Zambia, is yet to issue quality assurance standards.
- **Formulate EIA guidelines including Guidelines on forestry certification for RE based mini-grid projects.** Zambia has an established Unit to undertake Environmental Impact Assessments (EIA) under the Zambia Environmental Management Authority (ZEMA), formerly the Environmental Council of Zambia. However, stakeholders noted that the Unit is under-capacitated in terms of manpower and resources to go to the field. Standard EIAs were prepared prior to the establishment of the RE mini-grids. The Hydro Pilot Project was requested to undertake a full EIA at a cost of 98,000 Kwacha (approximately US\$ 20,000) and the inspection team of the Department of Environment, Zambia undertook a follow-up visit, approved the pilot site and granted the project the go ahead. There are mixed messages about the value of this EIA between the stakeholders ranking from satisfactory to moderately unsatisfactory. It is not clear to the evaluation team what specific input the project provided to build capacity in the Department of Environment to undertake EIAs and establish the EIA guidelines. The project did undertake a number of feasibility studies but it is not

¹⁶ The Government of Zambia issued a revised National Energy Policy in May 2008 with support from the Government of Sweden. Discussions with stakeholders indicated that there are outstanding policy areas, in particular related to the absence of rural electrification strategy and budget for its implementation, absence of guidelines for connection to mini-grids, and absence of a detailed renewable electrification plan.

¹⁷ UNIDO, personal communication 2014

clear whether there was formalised training within the Department on how to evaluate the EIAs or at what level the Department staff participated in the feasibility work.

- Based on the evaluation interviews and review of documents supplied, the evaluation team finds the achievement of this output as **Moderately Unsatisfactory (MU)** largely because the actual deliveries against this output are unclear. There have been talks and engagements but the actual project input to build the institutional capacity is not clear or documented.

Output 2: Building National and Local Capacities to Promote Renewable Energy Based Mini-grids

- ***Train key stakeholders on evaluation and benchmarking of renewable energy projects.*** The evaluation found records of a one week workshop held in July 2011 on financial evaluation and management of projects. Senior staff of the DBZ participated in this workshop. The evaluation notes from interviews that the training was executed as “on the job” – training and notes that several sites for possible mini-grids were assessed. However, the evaluation did not come across capacity building or training plans for the trainings or was not able to identify what knowledge was, or was not, in place prior to the trainings. The PIR of 2013 states that all stakeholders were trained on evaluation and benchmarking of renewable energy projects, but no specific details or training reports are available. The local communities, especially women groups, are not recorded to have been involved or trained in elements of use of electricity during the planning and installation stage or the mini-grids implementation stage.
- ***Train experts, trainers and planners in best practices for technical and financial services for projects, disseminate information and implement replication strategy.*** A two-day workshop was held for stakeholders on feed-in tariffs for renewable energy. Considering that feed-in tariffs are appropriate to conditions where markets are liberalised, transparent and with high degree of benchmark data available it is the technical view of the evaluation team that the promotion of feed-in tariff is still an issue that needs further adjustments at the national level. . There are records of training in the bio-gasification technology with participation, among others, from the CEC. Also a one-week workshop with participation from DBZ was held on financial evaluation and management of renewable energy projects. There are no records of systematic dissemination of information in Zambia during the project lifetime and interviews in Zambia suggested that no substantive information dissemination activities took place¹⁸.
- ***Strengthen national capacities to manufacture, assemble and maintain renewable energy based mini-grids and reduce implementing costs.*** The project document planned for capacity and training programmes to be organised for local and national government officials, public and private sector officials, manufacturing units, maintenance service providers, NGOs and communities to build a solid technical and planning base.
- In 2009 steps were taken to initiate collaboration between Glamorgan University, U.K. and University of Zambia (UNZA) at Lusaka to develop a renewable energy course for graduate engineers in Zambia. This was preceded by a scoping visit in November 2007 by the University of Glamorgan to Zambia, together with UNIDO and the University of Zambia to assess options for developing an MSc course in Renewable energy and the training of national champions at Glamorgan in the area of solar energy. Two senior School of Engineering staff (Dean and Senior Energy Engineer) subsequently visited Glamorgan to further discuss the proposal of establishing solar PV and thermal manufacturing and training in Zambia together with the establishment of a regional Knowledge Transfer Centre based in the School of Engineering at UNZA. A second visit in 2010 involved a visit to the solar mini grid site and aimed at demonstration of the concept and the LED lighting system designed and proposed by Glamorgan for fishing and home use. During the visit, the earlier discussions on the proposed centre, training of the trainers and finalisation of the proposed MSc in renewable energy curriculum were continued. The evaluation team visited the University of Zambia in November 2013 and these developments were confirmed but the collaboration has not been sustained. It is the view of the evaluation that collaboration should continue.
- ***Conduct capacity building and training of the key stakeholders technical planners and investors and experts.*** Training is recorded for staff from ZESCO, CEC, DBZ, and REA and for a number of planners and experts. A team from mainly ZESCO were trained by the Indian Institute of Science in gasifier technology. This enabled ZESCO to establish, run and maintain the pilot bio-gasifier in Ndola. When ZESCO withdrew from the

¹⁸Statement based on core interview with the former Project Director to verify interviews with other stakeholders.

project and the pilot was taken over by CEC, the CEC staff also travelled to India to familiarise themselves with different technologies¹⁹. A two- day workshop was held in 2007 in which there was a total of one hour of input from a UNIDO funded technical expert on the subject “Sustainable Energy Regulation and Policy Making for Africa” and another one-hour input on the subject “Case studies on tariff setting”. Training and study tours included:

- 11 participants on a study tour to China / and partly India October 2006 – prior to the official recorded start of the project;
- 4 participants in South Africa in April 2007;
- 2x3 participants in India in October/November 2007;
- 32 participants in a 2 day workshop in Lusaka on tariff setting November 2007- see above;
- 2 participants in Columbia and Brazil in May 2008;
- 2 participants in Senegal in September 2008;
- 4 participants in Mexico in October 2009;
- 26 participants in a workshop in Lusaka 2010.

71. On the job training also occurred at the pilot plants (see paragraph 90).

72. The interviews and documentation gives no evidence to activities on:

- Sectorial or institutional capacity assessment “before and after interventions” documenting what capacity has been established;
- Manuals for wind and biomass as described in the project document;

73. Local communities, especially women groups, are not recorded to have been involved or trained in elements of use of electricity during the planning or installation stage or the mini-grids implementation stage.

74. **Build capacity of financial institutions to appraise renewable energy based projects.** A one-week workshop was held in July 2011 on financial evaluation and management of renewable energy projects. Senior staff of the Development Bank of Zambia (DBZ) participated in this workshop. The evaluation team notes from interviews that training was executed as “on the job training”, with DBZ staff involved in the appraisal of pilot projects. The evaluation team were unable to locate any training needs assessment material or training plans. No evidence has been recorded from project files or interviews in Zambia to suggest that any systematic training was provided to any other financial institutions.

75. There is evidence that institutions such as DBZ, CEC, ZESCO, Forestry Department and some specific stakeholders benefited from the capacity building activities. Whilst it is possible that some capacity to promote RE has been built both at national and local levels, the evaluation team has no records documenting the results/outcomes of the study tours and workshops organised by the project. It is hard to evaluate to what extent capacity was built without a baseline of the institutional capacity in 2006, detailed records of the tours and workshops and an assessment of changes in stakeholder capacity attributable to the project at completion in 2012. It is clear that some activities have taken place but with the insufficient information available it is not possible to assess whether capacities have been built, or whether the adopted modalities were the best possible to build capacity of the participants. The evaluation found no evidence that capacity building activities were designed and implemented in a structured or systematic manner, or that they were based on a capacity assessment. It therefore, **finds the implementation of this output to be Unsatisfactory (U).**

Output 3: Planning and Setting up Innovative Project Financing Mechanisms and Structures

76. **Create an innovative funding mechanism to cover risk and support replication of renewable energy based projects.** It is understood from the interviews that this subject has drawn much attention and discussion at national and project level. A result of these discussions was to convert the GEF grant made available for the pilot project into a soft loan. This consisted of a zero % interest loan, a grace period and 8-year payback

¹⁹Direct quote from the Project Implementation Report GEF UNIDO 2013.

period. The loan to the pilot projects is to be repaid to the DBZ and from there transferred into a revolving fund that could reuse the funds for new RE mini-grid investments.

- a. The Hydro project grant converted to a soft loan amounts to US\$ 568,000 of which US\$ 62,000 still remains to be paid out to cover building of living quarters for the site manager²⁰.
- b. The Solar project has received a soft loan of US\$ 646,000 taken up by REA on 2nd September 2011. The project received 36 months grace period. The commissioning is not yet complete and the repayment is due to start sometime in 2014 or 2015.
- c. The Bio-gasifier project has received a soft loan valued US\$ 798,092 with no grace²¹ period and 8 years payback. The loan agreement was signed in 21st January 2013 after completion of the full project under evaluation. No funds had been drawn under the loan at the time of evaluation in November 2013²².

77. It is too early to evaluate how the innovative funding works as no funds are yet paid back and no agreement was presented on the modalities of a revolving fund. The idea and action converting the grant to a soft loan is noted as a great beginning.

78. **Implement methodology and procedures for use of revolving fund for renewable energy.** Draft guidelines have been prepared by the project based on experiences from other revolving funds. The implementation of methodologies and procedures is still to come, awaiting the final establishment of the fund.

79. **Assist financial institutions to finance renewable energy based projects.** As noted earlier, the project document identified private sector involvement as a core driver for sustainability and cost reduction. However as the project was implemented it became evident that private sector engagement was not realistic in the Zambian context at that time. The pilot projects were established without the involvement of the private sector and without the involvement of private banks, though CEC, a private company did become involved at a later stage.

- a. The Mini-grid project was implemented by the national utility ZESCO. The Zambia Electricity Supply Corporation raised 86.5% of the finance for the project while the project grant that was converted into a soft loan covered around 13.5% of the project costs. The main reason for the nearly two years delay in the establishment of the hydro mini-grid was due to lack of finances; the equipment had to be procured but because finances were not in place, the installation had to be delayed until ZESCO succeeded in securing the required funds.
- b. The Solar mini-grid was set up by the Rural Electrification Authority (REA) and REA organised the finances making up the financial gap between the US\$ 640,040 received as a soft loan and the total project cost²³.
- c. The biogasifier pilot was, after the initial withdrawal by ZESCO, taken up by the Copperbelt Energy Company (CEC). The CEC has organised the finances and the full loan amount is not known to the evaluation team. The grant/soft loan portion is US\$ 798,092. At the time of the evaluation visit it had not been withdrawn.

80. There is no evidence that the project assisted in the soliciting of finances, beyond the facilitating of the loan through DBZ. The interviews suggest that the institutions that took up the pilot projects as owners were responsible for mobilising the required financial resources.

81. Further development of the fund and its' implementation methodologies are, as per April 2014, still at a draft stage. The absence of finalised revolving fund documents and therefore, lack of implementation of methodology for evaluating and allocating funds to new projects and the lack of input to support further soliciting of finance for the three pilot projects **lead to a conclusion by the evaluation team that the achievement of this output is Moderately Satisfactory (MS). This relatively positive score is based on an assumption that the fund will, one day, be established.**

Output 4: Implementing Pilot Renewable Energy Based Mini-grids to Demonstrate Business Models

²⁰ Copy of loan agreement between DBZ and ZESCO

²¹ Copy of loan agreement between DBZ and REA

²² Copy of loan agreement between DBZ and the Copperbelt Energy Corporation PLC

²³ The evaluation was not able to review the loan documents for the three pilot projects

82. **Install and start up pilot mini grids.** The project intended to install and start up three pilot projects: a hydro mini-grid; a solar mini-grid and a bio-gasifier.
- a. The selection of these technologies was done prior to formulation of the project document and the evaluation team was unable to evaluate the rationale for the choice of technologies.
 - b. Details of delays and changes to the implementation plans as well as ownership are recorded in the PSC meeting minutes and Project Reports. The core facts are:
 - i. It was decided that the hydro mini-grid should be established by ZESCO (the national utility) as no private investor was identified. The detailed design showed that substantial changes were needed as the mini-grid otherwise would be without, or with very little, power for five months per year during the dry season. The project was redesigned to include a small dam and the size was increased to 1MW. The plant was commissioned in November 2012. All consumers pay to get connected to the hydro mini-grid and the connection fee was reduced from 1,500 to 150 Kwacha. The evaluation did not become aware of any issues related to power supply. At the time of the evaluation, the plant was operating at 10% capacity since there was not sufficient number of connections to consumers²⁴. However, there is a large farm in the coverage area which has decided to revitalise their large scale cattle and crop production activities and this would significantly increase the power uptake and thus push the consumption to more sustainable levels²⁵ (see also paragraph 132).
 - c. It was decided that the solar mini-grid was to be established by REA also because no private sector investors could be identified²⁶. The plant was designed for 600 kWh storage capacity according to the Bill of Quantity. It is noted that the first design was for a smaller plant and the UNEP backstopping questioned the Bill of Quantity / price and argued that the BoC/price was very high and requested that this be adjusted. It UNEP's request appears to have been followed by improving the Bill of Quantity without, however, achieving the quantity when delivered. The contract was revised to take into account the material variations. However these variations were within the tolerance design limits of 25% of the contract price. The plant was ultimately established with a 390 kWh storage capacity. The shortfall was unaccounted for at the time of evaluation.
 - d. A number of quality faults in the solar mini-grid were noticed. For example, all equipment was reported to have arrived in opened, not original boxes; the monitoring equipment was missing from the control-boxes sending too high voltages directly to the system; light bulbs came with a five year warranty but proved faulty after 3 days to 3 months. At the time of the evaluation, the light bulbs were in the process of being replaced at no cost. A total of 449 households are connected including a local clinic, a church and similar communal facilities. The plant was scheduled to be commissioned in November 2013 (the week after the evaluation as part of a visit to the area by the President of Zambia) but prior to rectifying all operational faults²⁷. It is the understanding of the evaluation that no detailed reports of the solar mini-grid installation seem to have been submitted to UNEP.
 - e. The Biogasifier is yet to be completed. In 2011 ZESCO withdrew from the biogasifier demonstration project and CEC agreed to take over the biomass mini-grid but decided to relocate the project to Kitwe. The main reason being that biomass fuel was not readily available in Kaputa, while there is sufficient fuel from the sawmill waste located around Kitwe²⁸. The evaluation team did not visit this project site but during a separate mission to the CEC in February 2014²⁹ it was confirmed that the feasibility study had not been completed and the plant was not yet at the procurement stage. A 25kW pilot project has been set up by CEC from the 1 MW biomass gasifier plant planned. The demonstration project was delayed and hence unable to meet the December 2013 DBZ loan-financing deadline. This delay was largely due to uncertainties about the correct location of the biomass

²⁴ Interview with project initiators, project manager, ZESCO, DBZ, recipients

²⁵ Interview with ZESCO mini-grid manager 10 February 2014

²⁶ The evaluation assumes this is because the financial viability of the concept needed to be first piloted and documented. The evaluation found no indications of attempts to involve the community, such as the Cooperative, in the ownership of the solar mini-grid.

²⁷ Interviews with the project initiator (REA); project managers; equipment supplier; DBZ; recipients

²⁸ According to the project team, and reports of the PSC, wood plantations had already been established to feed the biogasifier prior to ZESCO's withdrawal.

²⁹ Interview with CEC Joel Manda Mwale 10 February 2014

gasifier; Kitwe is not a rural area and the grant from UNIDO was, according also to REA rules, to be allocated for rural mini-grids only. It has been considered to re-classify the outskirts of Kitwe as rural to allow for a release of the grant subsidy. The environmental impact assessment has yet to be done, but as mentioned the more profound questions pertain to issues of linkage to the transmission network and whether the plant site can be considered rural and therefore to qualify for the Smart Subsidy under the DBZ loan. Final decisions are yet to be made on relocation of the plant site to Lufwanyama District on the rural outskirts of Kitwe and reducing its capacity to 500 kW³⁰.

83. **Train operational and management staff of the pilot projects.** Evidence derived from the project documentation and evaluation interviews indicate that the project was very successful in ensuring training of operators and management staff for the pilot projects. Training for the biogasifier included a study tour to India. On the hydro pilot site the project manager and staff were trained in China and they worked alongside the Chinese contractor through the installation work. This helped the individuals trained to develop key skills and created teams of competent project managers. Both, the hydro and the solar teams expressed full satisfaction with the training received, as well as full satisfaction in terms of being equipped to manage the pilot sites.
84. **Establish linkages for productive use of renewable energy.** The project implementers did not optimise the engagement of adjacent communities prior to and during the construction of the mini-grids and thus, missed the opportunity to have demand in place to utilise the electricity, to pay for maintenance and to take immediate advantage of increased income opportunities:
- a. The hydro mini-grid has come to being because of an application submitted by the REA by a lodge owner together with the Chief for the Shivan'andu District. These individuals have played an important role in the development and establishment of the hydro mini-grid and the hydro project is predominantly connected with users that need electricity for productive end-use. The lodge itself reported significant reduction in costs for diesel; shops had started to stock frozen meat and milk and they reported increased financial turnover. A significant improvement in productivity was recorded at a school where the pass rate had increased from 60% to close to 75% this was attributed to the pupils gaining access to computers and also light for studying in the evenings. While there is clear evidence of productive use of the electricity from those that already had productive engagement, there were no additional productive end use projects currently being initiated³¹. The project allocated US\$ 50,000 towards this activity which was spent on a baseline survey of the communities, completed in September 2011. The study identified options for productive end-use and relatively easy electrification options because many of the houses already have burnt brick walls and zinc roofs, making them more suitable for electrification than more traditional structures. However there were no follow up activities. According to the UNIDO's Country Programme Evaluation, the development of a plan of action for catalysing productive uses was a key output for UNIDO's RE projects in Zambia, but the only output delivered against this output by the mini-grid project was the baseline report produced in 2011.
 - b. Due to a low up-take by community members only 10% of the capacity of the hydro project was being used at the time of the evaluators' field visit. The considerable under-utilisation of the hydro plant undermines the business model as it is not financially viable at present and more worryingly, the turbines are designed to operate at a minimum of 70% capacity. The low capacity could eventually damage the turbines. The Plant Manager attempted to overcome some of the damaging effect by running the turbines only one at a time but even that can lead to severe underutilisation. As there is no immediate solution to increase the uptake of power within the mini-grid area, ZESCO is considering extending the main grid by an additional 10 Km to reach the mini-grid substation and let the power from the mini-grid feed into the main grid. This would obviously save the turbines and the electricity produced would be well received somewhere in the main grid. On one hand the solution defeats the purpose of showcasing a viable business model for hydro mini-grid³², but on the other hand the feed-in tariff to supply electricity to the main grid could also improve the short-term financial viability of the plant while waiting for higher uptake by the community. In February 2014

³⁰Interview with Senior Manager, Copperbelt Energy Corporation

³¹Baseline report from the Shivan'andu mini-hydro project September 2011.

³²Interview with the Hydro Management Team; ZESCO; schools; clinics; a farmer, a lodge owner and the District Chief.

ZESCO shared information that a farm in the area might revitalise their dairy production and initiate other energy-consuming farm production activities which, if initiated, would solve the problem related to lack of consumption. Three additional transformers are required in order for the farm to initiate all possible productive initiatives. The lesson learned by the project team is that aspects of productive end-use and integration of the full community in a mini-grid catchment area need to be fully integrated right from the very early conceptualisation stage so that there is time to engage community members and establish the demand for productive end-use activities up front³³.

- c. The solar project suffered from weak community engagement during the planning and implementation stages and the importance of productive end-use was not sufficiently addressed. Evidence showed that the electricity was used predominantly for light; TV and radio and, despite the fact that this was a fishing community, the evaluation team saw no indications that the electricity was used, for example, to store frozen fish. Discussions during the evaluation generated ideas such as:
 - i. Involve the health workers prior to electrification to talk about use of TV and use of electricity;
 - ii. Involve educational specialists prior to electrification to discuss use of electricity for educational TV, computers for learning etc.;
 - iii. Involve the cooperative prior to electrification to discuss expansion of businesses and establishment of new business ventures as and when the electricity is installed.
- d. The evaluation team did not visit the biogasifier project, as installation had not yet begun. Therefore, the evaluation relies on interviews and reports when assessing the progress of the biogasifier demonstration. According to documentation, there was insufficient supply of fuel for the biogasifier plant in its originally planned location, and moreover, due to delays, a national grid was finally planned to be extended to the area. In 2011, an agreement was made with the CBC to implement the biogasifier project in the Kafue district. Consequently a loan agreement was signed with the DBZ but no funds had yet been disbursed at the time of the evaluation.

85. As far as the importance of productive end-use is concerned, it is the view of the Evaluation Team that there are plenty of options to create and expand business at the local level when an area is electrified. The project, however, did not fully harness these opportunities in any systematic or documented manner. One of the views expressed by the project team on this was that productive end use happens by itself after electrification, without outside intervention.

86. **Conduct close supervision of pilot project operation(s).** Only the hydro pilot project was implemented while the project was still operational. The project has therefore, only had the opportunity to closely supervise the hydro pilot project out of the three planned pilot projects. The project, however, supervised the biogasifier pilot also at its early stages, and was heavily involved in the design and feasibility stage of the biogasifier pilot. When ZESCO pulled out of the project and CEC took over the work had to begin from fresh and with the UNEP project coming to an end there were no further resources for follow-up.

87. Both the hydro and the solar pilot plant construction contracts were set up as turnkey contracts with technical supervision to be provided by the contractors. The evaluation team did notice that there was on-going communication between ZESCO and their contractor whereas the technical support related to the solar project was not observed.

88. The evaluation team noted that technical supervision by UNEP and UNIDO influenced the actual implementation of the pilot projects. The hydro mini-grid was originally designed to deliver 800 kW during the wet season and 300 kW during the dry season as the project was designed as a “run-off” without a dam. As part of a detailed feasibility design UNIDO had contracted a team of hydro-power experts from China who found that a better solution could be achieved if the “run-off” was changed to a small dam. The redesign resulted in an up scaling of the project to 1 MW in the wet season and 800 kW in the dry season. There is no

³³ Some ideas that were documented in the baseline study but not (yet) implemented included establishment of a school to train members of the community in carpentry and similar skills. For example, construction of the plant employed approximately 300 local community members and the evaluation is of the opinion that it would have been relatively easy to continue skills development with these individuals and facilitate a process whereby many small entrepreneurial businesses had been established.

evidence of technical supervision as part of the installation or inspection of bill of quantity. The team of hydro-power experts reported that they had taken full control of all inspection against the Bill of Quantity.

89. The project supervision was close and also related to the design and tendering of the solar mini-grid. However, installation of the plant took place after the project closed and therefore no technical supervision could be continued during the crucial installation phase. The REA is fully aware of a number of faults that can be recorded against the Bill of Quantity. The REA has appointed three staff members to manage the plant and to rectify the identified faults described in paragraph 90d.
90. Looking at the output 4 as a whole, the findings suggest that while the project has been highly successful in establishing two of the three pilot projects it has not yet delivered results that could demonstrate business sustainability because the implementation had been considerably delayed. A concern is the absence of initiatives to build engagement of the local communities and the absence to foster appropriate productive end use. A key problem has been the delays experienced in getting the pilot projects started, so it can be argued that the project did the best it could under the circumstances, but the question remains what action did or could the project have taken to make up for the missed opportunities. As a development project, these omissions are critical as their absence could weaken the value of the pilot implementation.
91. Whilst the implementation of the pilots was successful, the evaluation of the achievement of the full output 4 as planned is **Moderately Satisfactory (MS)**. **This is based on the assumption that the ZESCO, REA and CEC will pursue their commercial interests to facilitate the completion of the activities.**

Output 5: Establishing Project Coordination and Management Structures and Dissemination of Information and Lessons

92. **Select project team and experts.** All reports and interviews confirm that project team and experts were recruited on time. However, the decision was made³⁴ to cancel the recruitment of a renewable energy technical expert (the implications of this are discussed in the Project Implementation section below).
93. **Develop and implement effective monitoring programme:** The Project Document describes an M&E system that includes the use of a Project Steering Committee to review and provide strategic comments on progress and financial reports. Regular management reports were produced but discussions with the team members in Zambia indicate that these reports were not necessarily used for strategic adjustments in the project. The envisaged Advisory Committee (described in section IV) was not established. The M&E programme is discussed in detail under section V (F) below.
94. **Develop replication plan and information dissemination programme:** A replication plan and information dissemination programme were to be developed as part of project implementation. The main purpose of developing the pilot mini-grids was lessons learning and replication of such technologies in other rural areas of Zambia. The development of the mini-hydro plant could be perceived as having built the technical skills and confidence of ZESCO to develop further mini-hydro grids. A brochure titled “Renewable energy for sustainable development in Zambia” was produced in November 2012. The brochure is a summary of the project’s achievements. UNIDO reports having sent a film crew to Zambia in March 2014 to prepare a film about the mini-hydro demonstration project. Both initiatives are noted by the evaluation. The target group for these publications seems to be donor and funding agencies as the information content is documentation rather than “how to”. It is not clear how these information dissemination activities have contributed, or will contribute, to increased investment in Zambia. No evidence of activities targeting the local banks or local investors has been recorded. This is probably due to the fact that AEG, who had responsibility for stakeholder engagement and dissemination of information, was never formed. The 2013 PIR notes that the information dissemination activities were cancelled.
95. **Disseminate results and lessons learned and create regional network.** As noted above this activity was cancelled. However, as also mentioned, UNIDO developed a brochure to summarize the project’s achievements and initiated preparations to make a film about the mini-hydro demonstration project in 2014 after the project closure.

³⁴No formal documentation rationalising the decision to cancel the RE technical expert was available to the evaluation and so it was assumed to have been a decision made in consensus between all partners involved in management of the project.

96. The evaluation noted satisfaction with regards to project backstopping, work of the Project Director and contributions delivered by the short term consultants. However, unfortunately, execution of some project activities did not receive adequate support and backstopping from the project team, indicating that the decision to reduce the core team to a single person (apart from the administrative staff) was unwise. For that reason and because of the absence of formulation of an information strategy; the absence of systematic dissemination of project information the evaluation team assesses this output achievement as **Moderately Unsatisfactory (MU)**.

C. Effectiveness

97. Effectiveness measures the attainment of the project objectives and results in terms of contribution to:

- i. Direct outcomes from the reconstructed ToC;
- ii. Likelihood of impact also based on the reconstructed ToC;
- iii. Achievement of project goal and planned objectives.

98. As noted in earlier sections of this report, the result statements as defined in the project document were not consistent. The project goal and objectives can be found in section IV(B) and are visually displayed in the theory of change diagram in section IV(I) . However, the team’s impression from stakeholder interviews was that the goal of the project was understood by stakeholders to be much more simple:



99. Most interviewed stakeholders started off by saying: “this was a great project” yet the same stakeholders did, without exception, acknowledge that not all outputs (as stated in the project document) were delivered. If the project was evaluated only against implementation of the pilot projects, the evaluation would lead to a conclusion that the project was **satisfactory (S)**. However, the ToR for this evaluation requires evaluation of all aspects of the approved project design (taking into consideration any formally approved revisions)³⁵.

100. The electrification rate in Zambia is 3% and the target has been set for 30% electrification in 2030. Renewable energy mini-grids are one of the options to increase the electrification rate. A parallel option is the establishment of renewable energy mini plants that are connected to the main grid. The establishment of the hydro mini-grid under this project has, according to the stakeholders, contributed to the national realisation and acceptance that renewable energy and mini-grids can be effective tool(s) to achieve electrification. ZESCO and other stakeholders have attributed the intention to launch 12 additional hydro mini-grids to the success of the pilot hydro mini-grid implemented by this project. Many stakeholders considered the pilot mini-hydro as highly successful, but it should be noted that during the time of the evaluation, the hydro mini-grid operated at 10% capacity, which is a sustainability risk.

101. REA, on the other hand, as the owner of the solar mini-grid is caught in an unintended double role providing policy and distributing funds for rural electrification, but also owning the solar mini-grid as discussed in section VII(E). The situation was not envisaged, and not desirable and REA does not wish to be the owner of the plant. The community is disengaged from the ownership and at the time of the evaluation, there were no payments for the electricity coming through. While provision of electricity is deemed positive, this model is not ideal and the effects of the solar mini-grid pilot are not as clear as intended. The evaluation finds that the effectiveness of the solar mini-grid in showcasing the technical viability of establishing a solar mini-grid pilot project was highly successful, but the financial viability had not (yet) been established at the time of the evaluation and hence showcasing the financial viability of the solar mini-grid was highly unsuccessful. These issues related to financial viability are known to REA but the issue has not yet been resolved. Options could include looking at some of the new, highly effective stand-alone solar systems that allow for modular upgrade at individual household level. Alternatively, it could be accepted that solar mini-grids are a national priority that does not have to prove financial viability.

102. The biogasifier pilot project was given most attention to in the form of study tours to learn about the technology. ZESCO withdrew from the project in 2010 and the CEC took over. At the time of the evaluation, the pilot project was still in its feasibility stage and the loan had not yet been drawn. It is therefore premature

³⁵ToR for the evaluation is attached as an annex to this evaluation report and can be acquired from the UNEP Evaluation Office.

to assess the achievement of this pilot project, or assess its potential for impact. The evaluation finds it interesting that GEF funds have been spent on a pilot project that has not been delivered. The reasoning for paying might be linked with the desire to establish a revolving fund as also discussed in this report. There is however, no formal decision by the PSC to redirect funding to function as a capital in a fund, instead of being used for a pilot project. While it is possible that the PSC would have approved such re-allocation, the evaluation team did not find documentation that this change was discussed and agreed upon.

Achievement of outcomes as per the reconstructed Theory of Change:

a) Strengthened enabling institutional set-up, policy and legal environment

103. Some development in this outcome have been observed, with the issue by The Government of Zambia of a revised National Energy Policy in May 2008, including a section on RE. This activity was supported by the Government of Sweden.
104. Discussions with stakeholders indicate that outstanding policy issues remain in particular:
- a. There is an absence of rural electrification strategy and budget for implementation;
 - b. There is an absence of pricing policy for mini-grids³⁶.
 - c. Absence of detailed renewable electrification plan.
105. The interconnection and regulatory regime for mini-grids is not yet fully effective in facilitation of independent RE mini-grids. It is assumed that the delay in granting REA the permanent licence for the solar mini-grid relates to REA's double role which is legally not ideal. It can be speculated that a licence application from a private investor would have been approved but there is no evidence to support such speculation. The EIA was implemented according to the plan but the Department of Environmental Affairs of Zambia reported insufficient resources to undertake EIAs.

b) Established national capacities for deployment of RE and RE mini-grids

106. There are several recordings of study tours to attend international seminars and also visits to RE plants in India and China. The interviews and documentation, however, gives no evidence to activities such as sectoral or institutional capacity assessment before and after interventions, documenting what capacity has been established, or manuals for wind and biomass as described in the project document. The evaluation team did not record engagement of private sector or evidence that entrepreneurs initiated RE projects. While it might be possible this can happen in the long term, the outcome is a process that should be measurable at the time of completion of a project or immediately thereafter. Hence it must be noted that this outcome has not been met. However, capacity of participating government bodies, ZESCO and REA and of the DBZ has been increased. This is evidenced by the fact that they are taking the lead in developing further plants.

c) Financing of RE projects for rural electrification is facilitated

107. The project grant was converted to soft loans as a precursor to the establishment of a RE revolving fund. This paved the way for potential long-term sustainable finance. In 2007 UNIDO signed a contract with the DBZ to pay the bank US\$ 505,000 to establish and manage a risk and replication fund for renewable energy, train staff and put in place fiduciary standards and assist in creating financial market for renewable energy in Zambia. Draft guidelines for the funds operations were provided by the project based on experience from similar funds in other countries. However the fund has not yet been established. As per April 2014 the establishment of the Fund is still at the draft stage so it is not possible to confirm this potential success. There is no evidence that the project (or DBZ) facilitated availability of funds over and above the project funds. ZESCO reported that they had to secure the outstanding financial resources for the hydro mini-grid pilot without input from the project.

d) Barriers that constrain widespread use of RE mini-grids for productive use removed

³⁶ Whilst study tours were implemented, the project did not deliver systematic interventions in support of this

108. The evaluation team has not seen documentation providing a systematic overview of the barriers preventing the uptake of renewable energy in Zambia or a strategy and action plan for how to address these barriers and workshops/regulations/agreements that document decisions in support of addressing individual barriers.
109. As was discussed under the assessment of the achievement of outputs, the project did not address the need for “productive end-use of electricity” in terms of active interventions in the field. Government staff and other intermediaries have not provided support for entrepreneurs to establish businesses. At present, there is no evidence to suggest any facilitation by the project of private entrepreneurs as the establisher or owner of RE mini-grids. The evaluation team noted that a baseline report prepared in September 2011 identified options for productive end use and the project managers of both the hydro and the solar mini-grid confirmed that productive end use could be possible but no initiatives had been taken to organise this³⁷. In fact, the evaluation team finds that lack of engagement to mobilise productive end-use represents significant missed opportunity by the project.
110. From the interviews it is noted that the pilot project partners were not aware that the project was “a barrier removal project”. At the local level the project partners saw many barriers that could have been removed with some technical input. Examples include:
- Hosting of workshops to promote “productive end use”;
 - Hosting of workshops to train households on “how to use electricity” (need to switch off and not just let it burn out as one would when cooking on wood);
 - Hosting of workshops to mobilise the local schools to prepare teachers for computer learning;
 - Hosting of events to clarify how to remove identified barriers, such as what kind of upgrading of houses/roof structures would be needed in order for a house to be electrified. Barrier removal activities could have added great value towards both the hydro and the solar pilot projects in terms of mobilisation of the rural community and engagements to activate productive end use, and to increase connection and payment³⁸.
111. At the national level the following barrier removal areas that could have been addressed but were not given high priority by the project included:
- Revision of legislation (although some find that this was not part of the project design);
 - Revision of policy for rural electrification;
 - Revision of taxes / subsidies for rural electrification³⁹.

e) A replication and information strategy to promote RE mini-grids on commercial bases in place

112. The project did not produce an information dissemination or a communication strategy but in March 2014 UNIDO, independently of the project, launched the production of a video about the pilot projects in support of replication of the RE mini-grids. There is no local write-up of lessons learnt to be shared outside ZESCO, REA and CEC. The last outcome envisages a situation where financial institutions, the government departments and entrepreneurs freely and openly share information about RE as a means to increase and enhance investment. There is no evidence of achievement of this outcome. It is noted that both ZESCO and DBZ were engaged in the discussions with the evaluation team on the continuation of RE but there was no evidence that discussions took place on a broader scale.
113. The evidence shows that the project has not achieved the outcomes as they were described in the project document or against the reconstructed theory of change. **The achievement of outcomes is Moderately Unsatisfactory (MU).**
114. The rating, based on the Review of Outcomes to Impact is shown below.

Table 4. Ratings for review of outcomes to impact

³⁷Interviews at the two pilot sites

³⁸Interviews a mini-grid hydro and solar projects

³⁹Same as 36

Rating of the achievement of Outcome(s)	Rate progress toward Intermediate States
<p>Based on the evaluation it is found that the rating of the achievement of outcomes is:</p> <p><i>D: The project's intended outcomes were not delivered</i></p>	<p>The intermediate states were: <i>Increased investment in RE in rural areas and Higher level of rural electrification using RE.</i></p> <p>And the rating is C. Some progress towards intermediate states through planned government investment in further RE mini grids. The GHG emission reduction from the pilot sites had not been monitored</p>

115. The intermediate stages are reconstructed in the theory of change presented in section IV (I) and the outputs delivered by the project were assumed to contribute to the achievement of:

- a. **Increased investment in RE in rural areas:** Based on information supplied in April 2014 it is noted that ZESCO is in the process of establishing one or possibly two additional mini-hydro projects and REA is in the process of establishing two additional solar mini-grids. The financial viability of the solar is not yet clear.
- b. **Higher level of rural electrification using RE:** It is reported that ZESCO intends to establish additional, possibly 12, (over and above the 2 mentioned) additional mini-grids based on hydropower. However, it is also reported that no decision has yet been taken or construction initiated. It is likely that ZESCO will use mini-hydro to speed up the generation of electricity and thereby reduce the current national shortfall of electricity. But it is not guaranteed that the additional electrification will be for rural households. It might be that the mini-hydro will be used to stabilise the main grid and supply existing consumers or connect businesses in the district⁴⁰.
- c. **Less use of firewood and diesel:** Based on the information from the two pilot sites there is no evidence of reduction in the use of firewood. If the path is that the electricity is used for productive end use then it seems to replace diesel. If the path is to use electricity for households the indication is the electricity is used for light, refrigeration, communication and entertainment. The energy used for cooking however, continues to be wood. This pattern is also documented by the International Energy Agency in their research of energy use in newly electrified areas⁴¹. The lodge electrified via the mini-hydro project has reported significant reduction in the use of diesel.⁴²

116. All in all based on the analysis and the reconstructed ToC (see section IV(I)) there is limited evidence that the long-term goals will be achieved as a result of the project's activities. The evaluation team finds the **achievements towards intermediate stages to be Moderately Satisfactory (MS) because good ideas and attempts are beginning to be followed through and additional investment appears to be taking place.**

Achievement of the Impact:

117. **Energy related CO₂ emissions are being reduced.** The project's global objective as stated in the project's Planning Matrix was to contribute to reductions in CO₂ emissions. The users of the hydropower based electricity all reported a clear decrease in the use of fossil fuels. The lodge reported a reduction in cost for diesel around US\$ 320 per month to around US\$ 40 per month for electricity. The translation of this into litres of diesel is not available but as a principle it does translate to CO₂ reduction. Similar examples could be noted from the other users connected to the hydro-mini grid. There was a marginal reduction of use of firewood reported from the users –marginal because of the limited number of connections in particular the absence of connection of the households in the mini-grid area. If ZESCO decides to connect the mini-grid to the main grid

⁴⁰Interviews with ZESCO.

⁴¹IEA "Rural electrification in emerging Markets" 2010 and "Rural electrification reports" Annual reporting of socio economic changes in electrified areas Department of Energy, South Africa.

⁴² According to UNIDO's country Programme Evaluation, in order to make an impact on the stated aim of reducing local deforestation due to fuel wood use for cooking, a plan of roll-out of electric stoves needs to be made that is carefully balanced with other demands to the capacity of the SHP plant.

then it is unlikely there will be increased electrification of households in the mini-grid area. If a solution is found to fast track the household connections and get sufficient uptake of the capacity from currently 10% up to around 75-80% then the mini-grid hydro will contribute to significant reduction of CO₂ emissions. There was some evidence of direct CO₂ reduction from the solar mini-grid as the electricity did replace some burning of kerosene lamps and candles.

118. **Productive end use to ensure financial viability of sites.** The project document referred to a Poverty Reduction Strategy Paper developed by the Zambian Government which identifies pursuing rural electrification to uplift the living standards in rural areas as one of the key focus areas. Even though poverty reduction was not identified as a direct objective of this project and consequently no specific activities were targeted to poverty reduction, the project action to promote the development of productive end use would have been essential drivers in support project progress towards impact. While shop owners reported increased productive end use through sale of frozen food and cold items, no evidence was found of other forms of increased job creation, income-generating activities or investments. If the households are connected to electricity and the households in the community had organised to establish production facilities for carpentry and similar businesses then there would be evidence of contribution to reduced poverty. Similarly, the fishing village could have organised fish freezing and processing facilities. The evaluation found no evidence of involvement of women's' groups and local communities at any systematic level beyond mapping of the communities for the baseline report of the mini-hydro site. The evaluation finds this contradictory to the project document that called for involvement of the local community 'every step of the way'.
119. Seen from the perspective of reduction in CO₂ emissions and cutting of fuel wood this project is still at risk of not achieving the desired impacts but there are also possibilities for success. Had this been a mid-term evaluation or had there been resources to continue the support then there are reasons to believe that great successes could be documented. In the absence of supporting evidence the evaluation team views the **contribution to the overall goal as Moderately Unsatisfactory (MU). The absence of community engagement initiatives throughout the project implementation to systematically promote the establishment of local jobs is the single biggest reason for not rating this element higher.**
120. The evaluation team notes the highly positive statements from the stakeholders in Zambia yet because the narrow deliveries and absence of achievement of outcomes or intermediate states leading towards the desired impact (as it was and still is formulated in the documents that facilitated release of the grant) the evaluation score against **effectiveness is Moderately Unsatisfactory (MU)**. Had the project used the available tools to formally adjust the project logic and expectations the evaluation would most likely have rated the project higher.

D. Sustainability and replication

121. The evaluation of sustainability and replication includes assessment of the project's ability to sustain and replicate actions and deliverables. The sustainability is evaluated against and within the socio-economic settings and assesses institutional and financial sustainability. The project, according to the project document, consisted of a capacity building component as well as a component to establish pilot mini-grid renewable energy projects with the private sector as showcases for replication.
122. The evaluation did not find any evidence of systematic institutional capacity building interventions or policy development activities. It is noted that there was a two day workshop with two one-hour inputs on RE policies but that cannot be argued as institutional capacity building at national level. The evaluation team did not find evidence that the project has contributed to establishment of national structures and resources with technical, financial and socio-economic capacity to evaluate RE mini-grid projects. As mentioned previously, the project has not delivered systematic training that could have increased institutional capacities. All in all, it is therefore the view of the evaluation team that the sustainability of the project outputs is limited to the possible sustainability of the two pilot projects – the hydro and the solar as well as a question of replication of additional mini-grids.
123. Sustainability of the hydro mini-grid project. The hydro mini-grid was commissioned in November 2012 and is operating without major problems⁴³. From a technical installation point of view the evaluation team

⁴³Interviews users, project manager and ZESCO

noted no areas of concern after inspecting the dam, the intake, the pump house, the control room and the distribution network. ZESCO and its team on the ground are fully equipped both technically and financially to maintain the plant due to training in China and hence, high technical competency level and the institutional sustainability is viewed to be highly likely.

- a. ZESCO is the owner of the plant and holds a licence to operate and collect payments for electricity under the existing global ZESCO license. There is no reason to believe that ZESCO would default the repayment of the soft loan. In fact ZESCO has taken up 86% of the finance beyond the project's contribution and both borrower and lender give no reason to question the pay back.
- b. All connections are paid for prior to connection takes place. The process is that a customer submits an application and once ZESCO approves the application the applicant has to pay (currently Kwacha 150) and thereafter ZESCO will connect within two days. The two-day time frame is not necessarily complied with but most often ZESCO only "approves" the connection when they know that they will be able to deliver installation.
- c. All consumers have pre-paid electricity meters and electricity can be purchased from the local stores. This process is a standard process that applies to grid and mini-grid connected customers. There is no special tariff allowed for mini-grids which is a subject the project could have addressed under the Component 1 "Policy matters".
- d. A point of concern in regards to the hydro mini-grid project is that it only operates at 10% capacity⁴⁴. If this situation is not addressed the life-span of the hydro plant will be reduced (see discussion in section V(b)).
- e. As discussed, one solution to the low level of use is to connect the mini-grid to the main grid, it would also help the general shortage of electricity in the main grid and could serve as a demonstration of how to interconnect mini-grids to main grids. However, if this occurs there may be little incentive for ZESCO to keep subsidising the connection of rural households. A normal connection fee is 1,500 Kwacha and the hydro mini-grid households only pay 150 Kwacha. In the absence of a rural electrification policy that subsidises the connections to rural areas there will be a real risk that the intended beneficiaries i.e. "rural households" will remain disconnected. It is not possible immediately to increase the uptake of electricity from 10% to 70% purely through households that have applied for connection. ZESCO also cannot electrify houses that are prone to fire. The option of letting the turbines run without connection to the electrical part (meaning not produce electricity) has been discussed, but would seem like waste in a country with shortfall of power.
- f. The third and last option is for the farm to fast track considerations for increased farm productions such as dairy, cold storage facilities etc. This option would increase the employment in the local area which in turn would lead to increase local community income.
- g. There is a general consensus among stakeholders that the sustainability of the hydro-mini grid is somewhere between ML and L. Considering the low utilisation of the plant and the absence of an agreed plan to solve this problem, it is likely that the owner will extend the grid and thereby salvage the turbines and use the electricity which is in high demand elsewhere. The evaluation team finds the technical and financial sustainability itself to be likely, but with a risk of ending as a project that will not serve the intended beneficiaries and that will not contribute to achievement of the objective. If the electricity is fed into the main grid then the rural households will continue to cut down trees for firewood, purchase diesel and not have modern energy for productive purposes. The project is then at risk of not contributing to the project's overall objective of reducing carbon emissions and would not indirectly contribute to rural poverty reduction.

124. Sustainability of the solar mini-grid project. The solar mini-grid had not been commissioned at the time of evaluation and a number of technical faults, weaknesses and missing equipment were noticed. The owner (REA) is aware that the problems exist. The plan for completion of the project including a plan for correction of the technical faults and deduction in final pricing has been prepared after the evaluation team visited the project. The Evaluation Mission has been informed that the commissioning went ahead in mid-November 2013 and the missing elements and outstanding queries were addressed as follows:

⁴⁴Statistics from the pilot project in November 2013

- i. Review of design
- ii. Identify material inadequacy
- iii. Issue variations based on the gaps identified
- iv. Issue addendum to the contract
- v. Conduct line patrol and corrections of snags
- vi. Revision of the work programme

125. Arising from the above challenges, the performance period for the project was extended. Upon commissioning of the project, REA has undertaken to engage a management team to run and operate the plant. The team was initially trained by the REA and also by JICA Expert in solar technology, management and financial matters. At the time of visiting the pilot project in November 2013 the technical sustainability of the plant itself could not be confirmed⁴⁵.

126. With regard to financial sustainability of the plant, REA has confirmed that the re-payment will take place via the Ministry of Finance on behalf of the Government of Zambia as envisaged⁴⁶. A payment schedule will be signed off after commissioning and it is assumed that a one-year grace will apply. At the plant-level, financial resources are needed for maintenance and these resources can, according to stakeholders, only come from REA and users of the electricity. REA operates the plant under a temporary licence from ERB. Issuing of a permanent licence is not yet granted, but the evaluation found indications that a permanent licence will be granted. The licence is delayed because the legal mandate of REA is to develop policies for rural development and manage funding hereof. Hence, REA does not hold a formal mandate to own electricity plants and in fact such role would place REA in a double role driving the policy for rural electrification, allocating the funding and also executing the same electrification and collecting the fee. The Government of Zambia is well aware of the legal issues attached to such double role. The evaluation perceives this double role as problematic, but also perceives that not granting REA the licence might come with long-term sustainability challenges unless an alternative owner can be identified.

127. Since the evaluation mission to Zambia in November 2013, a model for the management of the Mpanta Solar Mini Grid Plant has been agreed. A community-based model where a multi-purpose cooperative, Kafita Cooperative, was identified and engaged to manage the Plant through a signed memorandum of understanding (MoU). This was in a bid to encourage community participation, acceptance and ownership of the project and also in fulfilment of REA's mandate of facilitating the formation of appropriate institutions to generate, distribute or supply electricity to specific localities in rural areas as stipulated in the Rural Electrification Act No. 20 of 2003. REA will retain the ownership of the Mpanta Solar Mini Grid Plant in the nascent stages of the plant, it being a pilot project. The existing local multi-purpose Cooperative in the area, Kafita Cooperative, will be responsible for the operation and maintenance, marketing and sales and management of the power plant. The REA will continue to support and build capacity in the local cooperative to effectively manage the Plant and when it is satisfied with the performance of the Cooperative, the Authority may consider transferring the full ownership of the project to the Cooperative which shall manage and operate the project on behalf of the community at large in Mpanta area. REA will also continue to monitor the Kafita Cooperative to ensure that it performs in accordance with the standards set by the Authority as stipulated in the Rural Electrification Act No. 20 of 2003⁴⁷. If the licence will be (if it has not already been) granted to REA, the question remains whether REA will be able to collect licence fees. When visiting the plant, the households had not paid for the connection to use the solar electricity and the electricity was provided free of charge, possibly as an attempt to so showcase the solar mini-grid. REA believes that a solution will be found as homeowners and institutions must pay for the electricity. The project management team on site had a meeting scheduled with the site cooperative to discuss the matter and in April 2014 it has been reported to the evaluation team that:

- a. REA recognizes the importance of payment of end-user fees by the beneficiary community, which is one of the key prerequisites for the smooth operation, maintenance and sustainability of the power plant. The Energy Regulation Board (ERB) granted REA provisional licences for generation

⁴⁵ As discussed in previous sections, the installation did not comply with the bill of quantity against the agreed design. It was noted that UNEP had questioned the bill of quantity / price already during the design and tendering phase and requested its adjustment. REA agrees on the issues with design and subsequently the contract has been revised.

⁴⁶ Same as above

⁴⁷ Written comment from REA April 2014

and distribution of electricity and approved the proposed monthly fees for the Mpanta Project in November 2013. The collection of end-user monthly fees commenced in November 2013. The Plant is still facing some teething problems in terms of collection of monthly fees as only about 45% of the fees have been collected. The collection rate is expected to improve with time as measures such as intensifying community sensitization campaigns on importance of prompt payment of end-user fees. REA is in the meantime providing financial support to the Plant to enable it to meet its monthly overhead costs⁴⁸.

- b. In order to ensure effective management of the plant, three (3) full-time members of staff who include one Project Coordinator, one Technician and one Accountant have been employed on a three years contract with REA – not the cooperative. The three employees are responsible for the day to day running of the plant. Members of the Executive Committee of the Cooperative and the three members of staff at the Mpanta Plant underwent training in order to build capacity to better manage the Plant. Areas of training conducted for the Cooperative Executive Committee included business management skills, basic technical aspects of the plant and corporate governance while the full-time staff of the plant underwent intensive training on the technical aspects of the plant as well as financial management. In the event that the Cooperative does not perform up to the required standards, REA will tender out the management of the plant to a private operator⁴⁹.
- c. To reduce risks associated with mismanagement of funds, the cooperative opened an independent bank account from the Cooperative existing account and this account is solely dedicated to proceeds from the solar project and it will be audited by REA. This is because REA will not be financially responsible for meeting the Operation and Maintenance (O&M) costs associated with the Plant. It is expected that the Plant generates revenue from the monthly end-user fees it collects to cover its O&M costs.

128. Based on the evidence collected by the evaluation it is unclear how the situation will develop as the 65% of households might refuse to pay because the issue of payment was not settled before the households were connected.

129. Without payment for the electricity from the households it is questionable for how long REA will be able to keep the plant alive as the costs will have to be covered from funds intended for new electrification. The strategy being used by REA to outsource the management to an external service provider will fundamentally depend on the ability to collect fees that can cover the costs. All in all there are many outstanding matters and while REA confirms there are processes in place to resolve the problems the final outcome is not guaranteed.

130. To give the project the benefit of the doubt, the sustainability of the solar mini-grid can in the view of the evaluation team be rated as moderately likely. However, it must be noted, that sustainability will depend on the handling of the outstanding technical faults, the overall plan for ownership of the plant and not least, it will depend on the ability of the solar mini-grid management’s ability to convince the households that they must pay for the electricity at least enough to pay for the O&M without considering repayment of the investment itself. To be sustainable on a broader replication scale the payments would also need to be able to cover connection charges. If the plant is not sustainable the households will be left worse off as they have invested in non-productive appliances such as parabola antenna and TV, those items will be useless without electricity.

131. Based on this analysis, the evaluation rates the project’s sustainability as:

Financial sustainability	ML
Socio-political sustainability	L
Institutional sustainability	ML
Environmental sustainability	L

⁴⁸Written comment from REA April 2014

⁴⁹Written information from REA April 2014

Catalytic Role and Replication

132. The project intended to showcase through pilot mini-grid projects the usefulness of mini-grids and thereby contribute to the continued uptake of RE mini-grids in particular by the private sector. The CEC is a private company that is licenced to provide electricity in the Copperbelt Area and has taken over the establishment of the possible biogasifier pilot project. However, the evaluation is of the opinion that it is not possible to attribute mini-grid development by independent small private investors to the pilot projects. The CEC has already completed a feasibility study for a 10MW gasifier⁵⁰ that has been approved for construction in Ndola, and it would be hard to argue that a subsequent establishment of a 1MW gasifier will have a catalytic role. However, the evaluation notes that the CEC has not yet finalised the feasibility study for the 1MW pilot biogasifier funded by this project.
133. The ZESCO expressed high satisfaction with the technical learning that has come out of the RE hydro mini-grid and there have been several references to additional 12 mini-grid hydro projects to be launched by ZESCO throughout the country in the future⁵¹. However, it should be noted that a similar announcement was made in 2006 based on potential World Bank support. Recent communication with ZESCO⁵² indicates that some hydro projects, both small and large hydro, are at the planning stage. ZESCO sees the mini-grids as effective plants to stabilise the grid at the outer points. Because the mini-grids are relatively fast to establish. The plans were presented to the evaluation team as an important contribution to national electrification targets. ZESCO noted that the hydro pilot project had been a great success in terms of allowing ZESCO to learn and appreciate the value of this technology. Documentation dated 31 March 2014 from UNIDO also indicates an agreed collaboration to continue development of mini or small hydro in Zambia⁵³. It is highly likely that ZESCO will continue establishment of hydro either for grid and possibly also as mini-grids.
134. The replication of the solar mini-grid (based on interviews in November 2013) was more questionable because an institutionally and financially viable pilot was not yet in place and the ownership of the mini-grid was not optimal as explained in previous sections. However, the evaluation team have been informed that, based on the lessons from the mini-grid, REA is now rolling out two mini grid projects namely Lunga (300kW) in the Bangweulu swamps in Luapula Province and Chunga (200kW) in the Kafue National Park in Central Province⁵⁴. The evaluation team were unable to obtain any information about the ownership and the important payment question for these new plants.
135. While the high electrification rate of the rural households under the solar mini-grid is positive, the absence of payment for the connection and absence of payment for the electricity does not provide an attractive business model, particularly for private investors. As noted, REA has taken steps to establish two additional solar mini-grids. However, if the financial, technical and ownership issues faced by the pilot are not resolved, the likelihood of encouraging private sector investment remains low. The solar mini-grid business model, as it was implemented by the project, as a tool for replication, is unlikely to have a catalytic effect.⁵⁵ The absence of engaging the community and potential investors in activities for productive end use up-front, has also reduced the project's potential as a model for replication.
136. At the time of the evaluation, the mini-grid based on a bio-gasifier has not yet been constructed. Additional communication with CEC in February 2014 showed that CEC has prepared a different 10MW feasibility study for establishment of a bio-gasifier using the huge stockpiles of saw dust that is available in Kitwe. However, the CEC has not yet finalised the feasibility study for the 1MW bio-gasifier co-funded by this project.
137. In conclusion, there is evidence this project has been a catalyst towards the establishment of RE but not of private sector's engagement. The evaluation team conclude that **the project's role as a catalyst can be rated as Likely (L)**.

⁵⁰ Using large stockpiles of saw dust that is available in Kitwe

⁵¹ See media articles attached in annex 5

⁵² ZESCO mini-grid project manager 10 February 2014

⁵³ South-South cooperation UNIDO-ZESCO-ICSHP power point presentation

⁵⁴ Written comments from REA received April 2014

⁵⁵ There are solar technologies on the market that are highly effective and for a fraction of the price can deliver reading light, street light and cell phone charging. The modular panels can be installed to increase capacity. Such standalone might prove to be more cost effective both at the individual and national level see for example: www.funae.co.moz

E. Efficiency

138. The project was considerably delayed to the extent that despite one year's non-cost extension only one pilot project was established before closure of the project. The commissioning of the solar mini-grid took place in November 2013 one year after project completion and there is no information about when the bio-gasifier will be commissioned as the loan has not yet been drawn. The delays are not clearly explained in the project reporting, with the exception of some clarifications provided in the PSC reports. There seem to have been very little progress towards establishment of the pilot projects during the first three years and the procurement process has also been long. The first years seem mainly to have been used for study tours. The evidence suggests that the delays are less a result of issues related to project design, but more related to a range of issues related to implementation⁵⁶. The reasons behind the delays include; i) the hydro mini-grid encountered delays since it had to be re-designed and because financial resources were not in place; ii) the solar mini-grid pilot was delayed mainly because the pilot site was changed and the ownership of the plant had not been confirmed; and iii) the bio-gasifier pilot was delayed as ZESCO pulled out and a new owner had to be identified who then needed allowance to assess the pilot design.
139. It is acknowledged that project timeframes often need to be adjusted but the evaluation found no evidence in the documentation or the interviews to suggest that while the project waited for some activities attention was devoted to speed up other deliverables. It is noted that the project mid-term review was cancelled, and although UNIDO's Zambia country evaluation⁵⁷ addresses this UNEP/UNIDO mini-grid project to some extent, it cannot be regarded as a substitute. A mid-term review / evaluation could have helped the project to adjust some of the overly optimistic expectations of the project document, but since by project's mid-point, most project funds had been utilized, it was perceived that there was little room for adjustments even if a mid-term review had taken place.
140. There is no evidence that the project has taken advantage of financial or political opportunities to overcome the delays, apart from identifying the CEC to take over the biogasifier project from ZESCO. The evaluation finds that efficiency could have been improved, by for example mobilising the households while waiting for equipment and installation of the mini-hydro plant to facilitate a smooth process of household connectivity and payments. Efficiency could also have been enhanced by hosting private sector workshops in order to promote private sector involvement while waiting for financial resources to materialise.
141. South-south exchange, supporting study tours and exchange of information and on the job capacity building between Zambian stakeholders and relevant organisations in China, India, South Africa, Columbia, Brazil, Mexico and Senegal. It demonstrated an innovative financing using the Private Public Partnership (PPP) approach through the DBZ, and this is an efficient use of GEF/UNIDO/UNEP and ZESCO resources.
142. **The efficiency of the project is rated as Moderately Unsatisfactory (MU) due to the poor alignment between the use of funds, implementation timeframe and the outputs that were to be delivered.**

F. Factors affecting performance

Preparation and Readiness

143. *The Project design* was found to be unrealistic in terms of duration, resources and results to be achieved, and the project's theory of change was not clear. In particular the following aspects were noted:
144. **Project concept and rationale** The evaluation found that the complexity of rural electrification processes might not been fully appreciated by the project and elements of the project design seem to underestimate what it really takes to make a change in a society. The project document acknowledges that the Government of Zambia considers rural electrification as an important contribution towards poverty reduction, to which the project could indirectly contribute to as a longer-term result. No activities were designed nor resources allocated towards the mobilisation of the communities in the rural pilot sites. Based on interviews with stakeholders, if this project was designed again, the project should have:

⁵⁶ Cancellation of the position of a full time international RE technical expert might have contributed to the delays.

⁵⁷ UNIDO Evaluation Group 2013. Independent UNIDO Country Evaluation – Republic of Zambia. United Nations Industrial Development Organization, Vienna.

- a. Spent resources to map the poverty level and understand the income situation of the individuals in the pilot sites;
 - b. Allocated resources to investigate options for productive end use taking advantage of the hydro/solar electricity to come;
 - c. Allocated resources to engage the communities through skills development while the pilot sites were being built so there would be a demand for electricity for productive end use;
 - d. Allocated resources to learn international lessons on rural electrification and productive end use.
145. It is further concluded that the complexity of RE mini-grid development was not fully appreciated and the many elements that need to be in place such as: land rights, water rights, environmental approvals, connectivity charges, tariffs and payment structures. Sale of electricity; maintenance; and installation logistics, were not in place. In retrospect the project could have added more value by trying to achieve less but achieve it better through more substantial input. The evaluation finds that the project's theory of change did not draw on existing experience in the development of rural electrification projects. The project document included a section on 'Past experiences of renewable energy technologies in Zambia' which refers to another UNIDO GEF project as a source of relevant lessons, but since these two projects were executed concurrently, it was not clear if and how lessons were featured in the project design.
146. **Logical framework.** It is the view of the evaluation that the objective was not clear and the outcomes were not consistent with a clear intervention logic. The project document gives four different formulations of the project objective and as discussed in previous sections, most stakeholders did not appear have a clear understanding of the project's objective. The causal pathways from activities to the outputs and from these to outcomes and objectives were not clearly defined in the project documentation. No baseline information on indicators is available for the project outcomes. The project document is long – almost 200 pages, not well structured and does not lend itself for easy engagement or absorption.
147. **Project Budget and time allocation.** The project plan was overly optimistic for the time and resources available. The evaluation finds that the project budget was insufficient to action all the planned activities. Most of the budget was utilized in the first two years, leaving insufficient funds for the mid-term review and for dissemination activities planned in the project document. Also, it is the view of the evaluation that the time allocation for the project was insufficient. It was unrealistic to expect that a project could undertake inception, identify mini-grid pilot sites, find private investors, design pilot projects, obtain finances, and initiate procurement within a period of two years. It is equally optimistic to envisage that all three pilot projects would be established within a year and that the final year could be used to mobilise local manufacturers to produce input to mini-grids and to mobilise local businesses to invest in mini-grids.
148. **Risk analysis.** The assumption that interest and willingness of the private sector in terms of independent power producers, local suppliers and manufacturers have not been managed and there has been limited involvement of the private sector. The willingness of the private sector to participate would be sufficient to warrant project initiation is perceived as overly optimistic by the evaluation. The risks as they were identified in the project document underestimated what it takes to contribute to change.
149. **Stakeholder analysis and plans to engage stakeholders.** The project document lists a broad group of stakeholders but it is not clear how the stakeholders were identified or how project resources were intended to be used to mobilise the stakeholders. However the evaluation considers that some partnerships were omitted from project design. These include: -
- a. Business Zambia;
 - b. Banking sector in Zambia apart from the Development Bank;
 - c. Rural cooperatives to engage farmer communities around how to use electricity or establishment of productive end-use activities;
 - d. The Universities was engaged in the early phase of the project with a visit from overseas but there does not seem to have been regular and sustained collaboration.
150. Though stakeholders were identified, the evaluation finds that the project budget did not allocate sufficient resources to partnerships and stakeholder mobilisation. There have been no activities focused on productive end use of electricity apart from a baseline study.

151. **The evaluation rates Preparation and Readiness as Unsatisfactory.**

Project Implementation and Management

152. As discussed in the previous section, the project experienced a considerable delay between the design and launch of the project. The evaluation notes that a Project Inception Workshop would have been a useful tool to review and reassess the project's planned activities and outputs given the time delay to ensure that the project plan was in line with realities at that time. Whilst, the project document did not plan for an inception workshop, it did, plan for 'awareness meetings' at the start of the project life to engage and inform stakeholders about project activities⁵⁸. These awareness meetings did not, however, take place. The project experienced significant delays throughout its lifetime, but particularly during the first years of implementation when the activities targeted to establishment of the pilot mini-grids or to influencing policy and legislative frameworks at the Government level, seemed to have been limited. The evaluation found that up until 2010 the main focus of activities was on study tours and identification of pilot project sites and during this period a great part of the budget for activities was spent or reallocated to administrative budget lines. The project management, both at UNEP and UNIDO changed around the mid-point of the project and a set of management decision were taken to adapt the project plan to the remaining time and budget available. Implementation focus was shifted towards establishment of the pilot projects. Perhaps since establishment of the mini-grid plants was perceived as a priority considering the time available, there was less attention given to policy and legislative work. However, because documentation on these decisions was weak, the evaluation has not been able to verify the causes and reasoning for these management decisions.

153. The project was designed to have a Project Director seconded by GRZ supported by one RE technical specialist and a number of Short Term Technical Expertise as well as administrative support. Early in the project life, the decision was made to cancel the post of RE technical expert and use these funds to finance the otherwise seconded National Project Director⁵⁹. Without disrespect for the impressive achievement of this individual, the evaluation is of the opinion that one person cannot implement a full project. The Project Director had to deliver the entire project single handed with the assistance of short-term consultants. While great expertise can be acquired from short-term consultants it is, however, often the case that consultants need additional support and guidance. The consultants were not responsible for the strategic and broader implementation aspects of the project and the Project Director was, in practice, left largely alone with all the higher-level implementation responsibilities. The option to discuss, share, generate new ideas and split the tasks at hand was not usually an option and it is the view of the Evaluation Team, based on interviews with stakeholders, that this single decision has had a considerable negative impact on the project. There is evidence of many activities and outputs not being completed because there are limits to what one person can reasonably deliver.

154. The evaluation team was informed that the management was effective and maintained good relations with all involved parties throughout the implementation period. All evaluation interviewees noted that the Project Director did professional job implementing this project and can be regarded as a great contributor to the results of this project. The evaluation also noted satisfaction with regards to inputs delivered by the short term consultant, as well as backstopping provided by UNIDO. There are reports of good collaboration and support from the UNIDO in Vienna and good but late input from the UNIDO centres of excellence. There is evidence that, particularly during the later years of the project, the project management was effective in adapting the project to changed conditions and to the delays the project experienced. These decisions might have been the key factor that enabled the project to eventually deliver the two mini-grid plants. However, there are no examples of how management adapted to changes in the sense that the need to change was not formalised or documented in a revised logical framework, revised activity plans, reviews or similar strategic instruments. It is not clear to the evaluation why, for example the element of closely involving the local communities in the project was not carried through. Also the reasons behind the late initiation of activities targeted to establishing the pilot mini-grids and the consequent changes in budget are not clear. The implementation mechanisms were followed in terms of setting up a Steering Committee, hosting meetings, and recording meeting minutes and the interviews all concur that the project responded well to directions

⁵⁸ Project document page 51

⁵⁹ It has not been possible to establish, based on facts available to the evaluation team, who made this decision.

and guidance provided by the Steering Committee. However, the planned AEG was not formed nor were the planned ‘awareness workshops’ held to engage stakeholders. Also, the mandatory mid-term review / evaluation was cancelled. There is a surprising absence of documented strategic discussions on the changes made to project activities and how these might impact on the overall project performance. The evaluation team notes that UNEP-GEF project execution/implementation allows for adjustments, clarifications and revision of project documents to factor in changes in the implementing environment that can or will affect the project implementation and otherwise influence the project achievement of results. It is the view of the evaluation that a mid-term review / evaluation could have helped the project to revise its outcomes. The project could have revisited its risk assessment and logic and adjusted its expectations, but it failed to make use of these instruments as there was no revision of the project logic. Of particular interest are risks related to delays in identifying project promoters and potential slow progress of the project, identified in the project document. According to evaluation findings, the risks have not been adequately addressed, and as discussed in other parts of this report, the project’s ability to avoid or mitigate these risks might have been overly optimistic. The assumption that the interest and willingness of the private sector to participate would be sufficient to warrant project initiation is perceived as overly optimistic by the evaluation. The risks as they were identified in the project document underestimated what it takes to contribute to change and it seems the project implementers did not make adequate use of the project document or the risk matrix as tools to manage and adjust the project. The view is based on the absence of documented decisions to revise the project design / approach. The evaluation notes that risks were assessed annually as part of the Project Implementation Review (PIR). The PIR in 2011 highlights a number of risks that remained issues of concern to the UNEP Task Manager.

155. **The overall rating for Project Implementation and Management is Moderately Unsatisfactory** Whilst the adaptive management actions during the latter half of the project were relevant and effective and enabled the establishment of two of the three pilot mini-grids taking into account the entire lifespan of the project.

Stakeholder participation and public awareness

156. There was good participation from ZESCO, REA and DBZ but there was very limited engagement of stakeholders outside these key partnerships. The project document listed a broad group of stakeholders, but these stakeholders were not engaged on a regular or systematic basis. Particular observations include:

- The project document highlights that at every stage of project implementation, local communities (especially women’s groups) were to be involved to ensure sustainability and local ownership of the project. There is no evidence of any involvement of women’s groups and local communities at any systematic level other than mapping the communities in one baseline report from the mini-hydro site.
- Absence of engagement of the private sector to take part in the establishment of RE plants and increased productive end-use activities as envisaged in the project document. There might be good reasons why the involvement of the private sector was premature but these reasons are not documented in a revision of the project document or revision of the project logic.
- Absence of engagement of the Bureau of Standard to play a proactive role in setting standards not only for RE technologies but also for electrical appliances to prevent sub-standard imports to be targeted at low-income households.
- The University and technical colleges were, as envisaged, engaged in the project activities in the early stage⁶⁰ but the engagement was not sustained and a visit to the University indicated that there was no further active engagement.
- Absence of engagement of the financial sector apart from the DBZ. According to ZESCO they had to mobilise their own funds or source of additional funding without the support of the project.
- Absence of information sharing through an internet platform or printed media. The public awareness activities were not implemented. These aspects could probably have been improved if the position of a long-term renewable energy expert had not been cancelled⁶¹.

⁶⁰ The project document refers to the Technical Education Vocational and Entrepreneurship Training Authority (TAVETA), public research institutes such as The Technology Development and Advisory Unit (TDAU) under the University of Zambia and the National Institute for Science and Industrial research (Project document paragraph 20).

- The project document envisaged the establishment of an Advisory Expert Group (AEG) comprising of experts and other key stakeholders, including local administration, NGOs and local industries to be responsible for the replication and coordination of the project activities. The AEG was to assist the PSC at every stage including mainstreaming gender issues into project activities by involving women groups in decision-making processes at every stage.
- The evaluation team found no evidence of any Expert Group being established and interviews with stakeholders confirmed that the participation of non-governmental stakeholders was weak.
- Awareness workshops were planned in the project document to engage stakeholders at the start of the project. However, these did not materialise.

157. As noted elsewhere, the reduction of core staff contributed to the low level of stakeholder engagement. The fact that the planned AEG was not established can be said to be a key factor in the unsatisfactory level of stakeholder engagement. The UNIDO Zambia country review notes “UNIDO projects in Zambia appear to operate in isolation.”⁶² **The rating for Stakeholder participation and public awareness is Unsatisfactory.**

Country ownership and driven-ness

158. The high level of country ownership and commitment in this project is demonstrated by the high level of co-funding provided by the national partners (see next section), which eventually enabled the construction of the mini-grids, including the construction of transmission and distribution lines. The presidential endorsement of the hydropower plant is also a sign of high country ownerships. There is a high praise for the project and the project is used as a positive example of the potential for further renewable energy mini-grid development. This feeling of ownership is, however, limited to the few stakeholders who were directly involved in the project. Wider dissemination of findings and of lessons could have led to increased ownership amongst key stakeholders. **The rating for Country ownership and drivenness is Satisfactory.**

Financial Planning and Management

159. The evaluation team notes that a large proportion of the budget has been spend on project management, staff costs and office expenditures whereas little resources have been allocated to undertake the “barrier removing activities” listed under the components 1, 2, 3 and 4. (See Annex 4 for detailed budget).

160. The project was set up with the Department of Energy, Zambia, who provided counterpart staff. However, the Project Director who was the Government Counterpart was paid by the project, instead the Government of Zambia. The reallocation of financial resources to fund the Project Director was done without allocating additional resources to the project. The budget lines for international experts were spent largely on the biogasifier. No international expert input was allocated towards the mini-hydro development but staff from ZESCO did go to China to study mini-hydro development. The evaluation noted that the project’s travel budget was substantial, and higher than the budget for technical inputs.

161. The US\$ 18,000 allocated to the employment an international finance expert was spent towards the end of the project for a seminar on feed-in tariffs (discussed in section V(b)). Considering that finance was a major barrier removal activity and that the integration of local finance and productive end use are highlighted in the project document as key for the perceived success of the project, input from a rural renewable energy finance expert could have added value towards sustainability of the pilot projects. However, such input should have been allocated early on during project implementation.

162. The project had a budget for a study tour which was used for a study tour to India on bio-gasification and a number of other international tours mainly during the first phase of the project.

163. The project budget (see Annex 4) envisaged that the pilot plants would be financed by the private sector. This investment did not materialise. However, investment in two pilot projects was provided by the Government of Zambia (REA) and ZESCO (who also took loans from DBZ). It is noted that the funds for all three pilot projects were transferred to the DBZ despite the fact that the third pilot has never been built. The

⁶¹Interview with the Project Manager

⁶² UNIDO Zambia country report page 48.

rationale for the payment is explained through the draft establishment of the Revolving Fund. According to the un-dated draft guidelines all funds for the three pilot projects should be transferred to the DBZ and once paid back from the projects these funds should be used to kick-start an on-lending facility. The undated draft guideline document carries computer date November 2012. Legally, the long-term governance of the funds is thus not yet in place.

164. From the documentation and interviews the evaluation notes that the transfer of funds to the project was not a delaying factor. The financial reporting has been completed by December 2013. It is noted that the funds transferred for the biogasifier have not been spent. The funds are held by the DBZ in anticipation of use for the biogasifier and then to be paid back and used for on lending in a revolving fund. The revolving fund is, as per April 2014, at a draft stage. **The rating for financial planning and management is Moderately Satisfactory.**

UNEP supervision and backstopping

165. UNEP provided supervision and backstopping throughout the project period through participation in the Steering Committee meetings and it is noted that UNEP in particular provided technical input during the design and procurement phase of the hardware for the mini-grids. The Project Partners all express satisfaction with the inputs. The evaluation notes that the delays in project implementation had implications on UNEP's supervision and backstopping role. One example is the solar mini-grid pilot project where the solar PV component was installed after the project had already been completed from UNEP's side and hence UNEP was not in the position to provide technical support or other forms of backstopping. **The rating for UNEP supervision and backstopping is Moderately Unsatisfactory.**

Monitoring and Evaluation

166. **M&E Design:** The indicators in the logical framework were impressive in terms of what would be achieved but they lacked SMART⁶³ness as time and measures were missing. The indicators were also unrealistic in terms of how much can be achieved with the available budget. The evaluation team has not been able to locate information, either documented or from the interviews that would set a baseline for the indicators. In theory the M&E framework was adequate as the project document spells out the actions to be taken, and by whom and when this will be done. The project document and budget included provision for the ex-post evaluation and this has been executed. However, the evaluation questions the adequacy of the evaluation budget (as well as the entire project) and is of the opinion that the evaluation budget was not sufficient to fulfil the requirements set in the evaluation ToR. **The rating for M&E Design is Unsatisfactory.**
167. **M&E Implementation.** As discussed in previous sections, the project's logical framework had certain shortcomings and the envisaged change process was not adequately thought through. Despite the fact that this was recognised by the project team, the logical framework was not revised or adjusted during the project life. The cancellation of the project mid-term review was a missed opportunity for the project to adjust expectations. The evaluation team finds the project could have gained value if an inception workshop and a mid-term review/ evaluation had been executed as these could have helped the project to adjust the expectations to the real needs as well as the time frame and budget that was left.
168. The project did follow the M&E reporting requirements (with the exception of the mid-term review and the consequent re-allocation of the MTR budget to other activities) throughout the implementation period. As a result of this, small adjustments were made to the budgets. However, there were no real content adjustments and no reported justification of why some specific activities were not implemented. The evaluation notes that there is no documented rationale and argumentation for some of the more fundamental changes that were recorded during the evaluation. These changes included:
- i. The decision to implement the investments with use of public funds only, instead of the envisaged private sector;
 - ii. The decision to exclude the involvement of local communities in the design and implementation phases of the pilot projects;

⁶³ SMART; Specific, Measurable, Attainable/Attributable, Relevant, Time-bound

- iii. The decision not to establish an information strategy and not to implement systematic information activities also towards the local communities and women groups;
 - iv. The decision to reduce the number of professional staff.
 - v. Decision not to form the Advisory Expert Group.
169. The lack of use of existing structures to propose revisions to the outputs and outcomes has contributed to a situation where there are wide gaps between the expectations written in the project document and the actual deliverables of the project.
170. It should be noted that the project was also reviewed by UNIDO in its Zambia country review, conducted in late 2012. However, the report was not produced in time to contribute to project management.
171. **Use of GEF tracking tools.** The project did report progress in line with the GEF tracking tools. It is not possible for the evaluation to verify if each of the scoring during a six-year project has been correct at the time the scores were given. It is the view of the Evaluation Team that the reporting was superficial, as it never really captured the real problem namely that the pilot projects were delayed and there was no involvement of the private sector. But the tool was used and the reporting approved by the Steering Committee and the evaluation can note that the reporting was done. **The rating for M&E Plan Implementation is Moderately Unsatisfactory.**

Complementarity with UNEP strategies and programmes

UNEP Strategy

172. The 2010-2013 UNEP Medium-term Strategy⁶⁴ highlights the need for greater coherence within the UN system for harmonisation of aid, increased focus on the role of the private sector, national ownership of development programmes and for results-based management. The project design was in line with UNEP's mandate and the Climate Change Sub-programme in that it attempted to assist the Government of Zambia to remove barriers for renewable energy production in order to reduce greenhouse gas emissions, both through implementing pilot projects and through influencing related policies. There was national ownership in the development of the pilot projects and greater emphasis on private sector engagement in theory although there was limited participation of private interests during project implementation. However, the fact that due to delays this project in practice omitted most policy impact work and focussed on the implementation of two pilot projects gives reason to argue that the project did not fully deliver against UNEP's mandate.

Gender

173. With regard to gender, the UNIDO country evaluation conducted in late 2012 noted that there is little sign of gender considerations in UNIDO project designs or implementation and this applies also to recruitment of project staff and consultants.⁶⁵ It notes that some electrification activities will have positive benefits for women and girls. It should be noted that one of the roles of the AEG was to mainstream gender throughout the project.

South-South Cooperation

174. The RE project demonstrated productive south-south cooperation by involving the IC- SHP from China for the SHP subcontract, allowing the Zambian workforce to work alongside Chinese specialists. For the Biomass gasifier demonstration in Ndola, specialists from the Indian institute of Sciences worked with CEC engineers again allowing south-south cooperation on a business level⁶⁶. Study tours were organised to encourage learning from relevant organisations in South Africa, India, China, Columbia, Brazil, Mexico and Senegal. The project was selected to present at the Global South-South Expo in 2012.

Bali Strategic Plan

175. The project's activities can be said to have contributed to the aims of the Bali strategic plan, as considerable training and capacity building was carried out in the development of the pilot plants. Two plants

⁶⁴UNEP Midterm Strategy 2010-2013

⁶⁵ UNIDO Zambia country report 2013 p xviii.

⁶⁶UNIDO Zambia country report 2013 p 48.

are now up and running, managed by government agencies. In addition these agencies are planning to go on and develop further plants.

VI. Conclusions and recommendations

A. Conclusions

176. The achievement of the project in developing RE mini grids has been perceived to be successful by stakeholders at the national level. So much so that the President of Zambia participated in the commissioning event for both the hydro and solar mini-grids. There is no doubt that the pilot hydro mini-grid has contributed significantly to an attitude change within ZESCO towards mini-grid hydropower and its usefulness for electricity production. It is envisaged that ZESCO will continue the installation of mini-hydro connected to the grid but not necessarily as stand-alone mini-grid⁶⁷. Bearing in mind that ZESCO and GRZ have not built power plants in decades the indication that mini or small hydro might be an element in future electricity production is positive.
177. Despite these positive outcomes, the evaluation notes that there is a mismatch between the project document objective(s) and what the project actually delivered. The project delivered two pilot mini-grids but despite the fact that all funds were spent, other key outputs were not delivered. The overall conclusion is that the project is Moderately Satisfactory. There are elements that are highly satisfactory and elements that are highly unsatisfactory. There are individuals who perceive the project to be very successful considering the history of renewable energy implementation in Zambia. The evaluation fully acknowledges that it is highly commendable that the project has succeeded in establishing two pilot mini-grids. The evaluation must, however, note that the objective of the project was to overcome barriers, such as legal, political, technical and financial, for increased uptake of RE mini-grids by the private sector. The delivery against these elements was low.
178. The Evaluation ToR introduced overall questions for the evaluation of this project that the evaluation was to answer. The general evaluation questions and conclusions are:
- a. *Did the project achieve its aim of contributing to the creation of a stronger legal institutional and policy framework to support renewable energy based mini-grids in Zambia?* The conclusion is that the project provided limited technical input towards legal and policy matters. While some stakeholders argue that such input was not needed because these issues fall under GRZ's mandate, it is the view of the evaluation that projects can quite feasibly add good value both to legal and policy matters. The Zambia National Energy Policy was ratified in 2008 just two years after the project began implementation. There were stakeholder views that it would have been premature for the project to immediately contribute to revising the energy policy shortly after enactment. The process of reviewing the energy policy however began in 2011 and specific lessons learned from the project need to inform the review process. The evaluation does take note that there are many examples from across the continent where a four year project has added visible value to the formulation of policies and legislation. The evaluation notes that the project SC did not undertake adequate measures to formally amend the project design and document the re-allocation of envisaged resources.
 - b. *To what extent did the project succeed in building national and local capacities to promote RE based mini grids?* The project has contributed to the engagement of ZESCO and mobilisation and capacity building of two project management teams both for the mini-hydro and the mini-solar project. The successful completion of the mini hydro has given ZESCO increased confidence to build other mini-grids across the country although such upscaling is still to be realised. According to ZESCO, additional hydro mini-grids will be established and REA intends to establish two additional solar mini-grids. Based on newspaper reporting, the private sector interest in renewable energy seem to be mainly targeted at large hydro-projects up to 700MW rather than RE mini-grids. This interest can not be attributed with certainty to the project, as similar interest

⁶⁷Interview ZESCO, UNEP, UNIDO.

has been seen over the past decade in Zambia and was promoted through a World Bank loan for small hydro projects in 2007.

- c. *Was the project successful in creating a sustainable funding mechanism to promote investment by PPI in renewable energy?* It is premature to express a final opinion on this question as only 2 of 3 pilot projects have been commissioned. The biogasifier pilot project had not yet started drawing its loan at time of the evaluation. No agreement was in place to establish a revolving fund and the pilot projects had not started to pay back on their loans. Based on the evaluation findings and interviews with DBZ, there are reasons to believe that the project has contributed positively to the acceptance of mini-grids as technical options for rural electrification.
- d. *To what extent did the project succeed in its aim of establishing three pilot mini-grids to demonstrate the technical and financial viability of using renewable energy technologies for rural electrification?* Two out of three pilot projects were established. One of the three pilot projects was commissioned within the lifetime of the project. The mini-hydro pilot documented full technical viability and also financial viability by extending the main grid to the project site and absorbing the electricity into the main grid, and thereby realising the plant's financial viability for ZESCO. The solar project was not yet technically viable in as far as there were outstanding quality and quantity matters against the agreed bill of quantity. The financial viability of the solar project needs to be established as this was not possible at the time of the evaluation. The long-term technical sustainability is therefore not guaranteed before the outstanding matters are resolved.
- e. *Overall, how successful was this project in meeting its goal of reducing barriers to the use of renewable energy technologies for rural electrification in Zambia?* The project was not successful in showing different private sector engagement models for technically and financially sustainable electrification of rural areas. However, the project did demonstrate that there are models by which ZESCO can integrate the rural areas in their national electrification programme.

179. With regard to project implementation and monitoring, the evaluation notes that there is no documented rationale and argumentation for some of the more fundamental changes that were recorded during the evaluation. This is discussed in detail in the section on monitoring and implementation.



Table 5: Summary of Evaluation Ratings

Criterion	Summary Assessment	Consultant Rating	EO Comment	EO rating (if different)	UNIDO Rating
A. Strategic relevance	The project design is well aligned with both national as well as GEF and UNEP / UNIDO priorities.	MS	The project was relevant to national priorities and aligned with UNEP and GEF priorities in terms of tackling climate change. However, the project was a one-country pilot	MS	MS

Criterion	Summary Assessment	Consultant Rating	EO Comment	EO rating (if different)	UNIDO Rating
			project without a clear strategy how to communicate the project or promote replication beyond Zambia.		
B. Achievement of outputs	The project was successful in setting up 2 of the 3 pilot mini-grid plants planned. However other outputs remain incomplete or were not achieved.	MU	Several key outputs were not delivered.	MU	MS
C. Effectiveness: Reach objectives and results	Outcomes as stated in the project document were not achieved. However, the successful implementation of the pilot plants had contributed towards the projects objective of promoting environmentally sound RE technology.	MU	Evaluation Office concur		MS
1. Achievement of direct outcomes		MU	Evaluation Office concur Not all direct outcomes were achieved		MS
2. Likelihood of impact.	While the involvement of ZESCO gives strong indication that additional RE mini-grids will be built the direct involvement of and impact on rural communities especially women is still to be identified. The impact might happen by itself over time but could have been enhanced and documented through active engagements.	MU	High level of government buy-in to develop RE mini--grids and evidence of replication by the GRZ are positive indications that the project will contribute to CO2 reductions in the future.	MS	MS
3. Achievement of project goals and planned objectives		MU	The project did not achieve all planned outcomes, but the results achieved contribute towards removing barriers for RE development in Zambia, largely contributed to the strong involvement of the Government of Zambia.	MS	MS
D. Sustainability & replication		ML	Agree		L
1. Financial	The financial viability and local participation in plant	ML		ML	ML

Criterion	Summary Assessment	Consultant Rating	EO Comment	EO rating (if different)	UNIDO Rating
	management remain unclear. The rotating funding scheme is not yet in place.				
2. Socio-political	The political interest in RE has increased through this project intervention. The socio-economic absorption especially in rural areas is not documented.	ML	The national ownership and interest to sustain the project's results and develop RE mini-grids further is high	L	L
3. Institutional Framework.	The project was designed to influence policies and legal frameworks in order to remove barriers for RE mini-grid development. However, these activities were not implemented. The GRZ has issued a revised National Energy Policy, but several outstanding policy issues remain. It is assumed GRZ will pursue the institutional development aspects through own and other support channels.	ML		ML	ML
4. Environmental	The establishment of the RE plants comply with national environmental legislation and there are no reasons to believe this will not be sustained going forward	L	No information provided in the report to rate this sub-criteria		L
5. Catalytic role and replication.	There is evidence this project has been a catalyst towards the establishment of RE, but not of private sector's engagement as planned in the project document.	L	Evaluation Office concur		L
E. Efficiency	No evidence of action taken to improve the efficiency of the project or to compensate for delays.	MU	The project team during the second half of the project responded to implementation challenges e.g. by finding new partners to invest in the pilot schemes but due to the slow delivery during the first half, there were no funds or time to deliver on some project components	MU	MS
F. Factors					

Criterion	Summary Assessment	Consultant Rating	EO Comment	EO rating (if different)	UNIDO Rating
affecting performance.					
1. Preparation and readiness	Project design was unrealistic in terms of duration, resources and results to be achieved.	U	Agree The project design did not respond to the realities on the ground, such as private sector engagement in RE, perhaps since the project was designed several years prior to its commencement. The design was also overly optimistic in terms of the results to be achieved with the time and budget envisaged.	U	U
2. Project implementation and management	There is no documentation to explain why project outputs were not achieved. Adaptations in management strategy were not recorded as revisions in the project document. With better documentation the rating would likely be higher.	MU	Agree. The delivery rate during the first part of the project was low but effective adaptive management actions during the second half of the project enabled establishment of 2 pilot mini-grids. Documentation of adaptive management was low.	MS	S
3. Stakeholders participation and public awareness	Communities were not engaged during the design phase of the pilot mini-grids. Private sector stakeholders or the national partners were not engaged in the follow-up workshops on lessons learned.	U	Agree – The involvement of the key stakeholders was high, but involvement of stakeholders beyond the key partners was low	MU	MS
4. Country ownership and drivenness	The project was implemented by GRZ and ownership is high.	S	The Evaluation Office concur		S
5. Financial planning and management	Financial reports were delivered on time and their quality was satisfactory.	MS	The Evaluation Office concur		
6. UNEP supervision and backstopping	While the interviews indicated satisfaction with the backstopping it is the view of the evaluation that UNEP could have used its supervision mandate to revise the project	MU	If UNEP supervision and backstopping had been adequately carried out key changes to project activities would	MU	MS

Criterion	Summary Assessment	Consultant Rating	EO Comment	EO rating (if different)	UNIDO Rating
	document, activities, budgets and time to match reality and expectations. UNEP could also have supported engagement of the rural communities, women and the private sector.		have been properly discussed, documented and compensatory strategies e.g. for engaging stakeholders in the absence of the AEG would have been delivered.		
7. Monitoring and evaluation	There is no evidence that the project logical framework has been used to monitor indicators or used to adjust expectations.	MU	Use of monitoring tools is not up to the UNEP and GEF standards.	MU	MS
a. M&E Design	Indicators were not smart and were unrealistic with regard to timing and budget. Baseline reports for indicators were not prepared.	U	The M&E framework was adequate and evaluation was budgeted for. Indicators lacked SMARTness and no baseline reports were found or they did not exist	MU	MU
b. Budgeting and funding for M&E activities	The project included a budget for M&E. However the budget for the mid-term review was used on other items.	MU	Agree Budget allocated for a mid-term review / evaluation was used to fund other activities	MU	MS
c. M&E Plan Implementation	Monitoring tools were not used to document key changes in project implementation or to guide adaptive management. The Mid Term Review did not take place.	MU	Mid-term review is an obligation for FSP projects but it was not commissioned. Key changes in project implementation were not documented.	MU	MS
Overall project rating	The establishment of two mini-grids, in difficult conditions and without the expected private sector support was a considerable achievement. Shortfalls in project implementation include missed opportunities to engage stakeholders, financial institutions, the private sector and very importantly the communities.	MS		MS	MS

A. Lessons learned

180. **Lesson number 1: More effective project design leads to more successful project outcomes** (see section G and Annex 9). The evaluation finds that many of the project's shortcomings were a result of poor project design. Future RE development support projects should ensure that the following aspects are included in project design:
- Awareness of the complexity of rural electrification processes and drawing on lessons from similar projects. This will contribute to more realistic risk analysis and estimates of required timing and budget requirements.
 - In depth stakeholder analysis, and planning and budgeting of activities to engage key stakeholders.
 - Defining SMART indicators for project outcomes, including collection of baseline information.
 - Development of a clear theory of change, presented in a way which can be shared and understood by key stakeholders.
181. **Lesson 2: Project Inception Workshops are an important tool particularly when there is a delay between design and implementation.** The inception phase is the time where the project implementer can host workshops and solicit views, requests and ideas from a broad group of stakeholders. If a project can secure stakeholder support then shortcomings in design can be overcome because there will be some momentum from the legislature, the private sector, the universities and the NGOs who might have access to additional and different resources and thus contribute to a greater achievement of the outcome. This is particularly important when, as was the case for this project, there is a delay between design and implementation.
182. **Lesson number 3: Community participation in mini-grid development should be fully integrated right from the conceptualisation stage.** The evaluation notes that greater community participation would have contributed to greater project success in financial and institutional sustainability and progress towards impact. See discussion in section B, Achievement of outputs, para 92 and achievement of impact para 127 and Section D, Sustainability and Replication. In particular:
- Increased ownership of the mini-grid plants, leading to greater uptake, willingness to pay and financial and institutional sustainability.
 - More emphasis on productive end use at the project design stage which would have contributed to greater progress towards the desired impact of 'reduced poverty through increased rural employment and other benefits of electrification'.
 - Future RE projects of this kind would benefit from ensuring that project design includes sufficient analysis of social factors, and design and budgeting of activities to engage community members.
183. **Lesson number 4: to ensure financial sustainability, electricity should be treated as a commodity and priced accordingly.** The two pilot projects applied distinct approaches to household connection. The solar pilot project electrified each and every household without a request for connection payment or payment for electricity. The hydro project required connection payment and installed pre-paid meters so all households paid for all electricity used. The solar pilot project did achieve a high connection rate but it is not financially sustainable and does not serve as a good lesson for replication. The hydro project is financially and technically sustainable. All community members are fully aware that they pay for cell phone airtime and there is no reason why electricity should not be treated the same way. It all depends on the motive for the pilot installation and the lessons are to make sure that payment is secured and explained right up front.



184. **Lesson number 5: Ensure sufficient technical support to achieve project outputs.** The evaluation is of the opinion that the shortage of core professional staff (discussed in the project implementation section, para 161) was a key contributing factor why some planned outputs were not delivered. A lesson for the future is to match the project outputs with the available inputs. If there is very limited funding available then it would be better to scale down the expectations.
185. **Lesson number 6: Systematic monitoring and documentation of adaptive management decisions is essential in RE development projects.** The evaluation is of the opinion that if project monitoring had been better designed and implemented, the overall performance of this project would have been higher. Effective monitoring is of particular importance in this type of project because of the rapidly changing environment and large number of stakeholders, which are likely to require high levels of adaptive management. Key aspects of monitoring and evaluation which should be observed in a project of this kind are:
- Use of baseline studies to define indicators and targets.
 - Ensuring that indicators are SMART
 - Organising an inception workshop
 - Commissioning a mid-term review/evaluation
 - Revision of project document to encapsulate management decisions over the project life.
186. Documentation of adaptive management decisions is essential for accountability purposes. Failure to document changes in strategy result in the project being penalised for not meeting the outputs planned in the project document, as has happened in the case of this project.
187. **Lesson 7: Collaborate with influential community actors.** Projects would benefit from working with local District and Community-level bodies (or forming these where they are non-existent) that should include community leaders such as traditional leaders, religious leaders, civic leaders and NGO and CBO based leaders to coordinate activities of rural electrification to encourage greater uptake, willingness to pay, and other productive end use of the project.

B. Recommendations

188. **Recommendation 1:** It is recommended that UNEP requests UNIDO and former national project counterparts to engage with the Copper Belt Authority to ascertain the likelihood that the biogasifier project will materialise and to provide technical support if needed for this process. It is very important to decide what to do with the funds that have been released and are being held by the DBZ, in the event that the plant is not built.
189. **Recommendation 2:** The plan to convert the mini-grid grants to soft loans for repayment and continued on-lending have not yet materialised. While REA and DBSA both acknowledge that there have been discussions to establish a revolving fund and draft documentation has been prepared, the fund was not established by the end of the project and it has still not been established by March 2014. UNEP should ensure that this issue is followed up or should request UNIDO to do so.
190. **Recommendation 3:** It is recommended that UNEP requests former national project counterparts to provide support in ensuring the existing mini-grids to attain financial and technical sustainability, and to support GOZA in the development of key policy areas which still remain to be addressed (see para 69):
- d. Rural electrification strategy and budget for implementation;
 - e. Pricing policy for mini grids.
 - f. Renewable electrification plan.

Terminal Evaluation of the UNEP/GEF project “Renewable Energy Based Electricity Generation For Isolated Mini-Grids in Zambia”

1. Project Background and Overview

Project General Information⁶⁸

Table 1. Project summary

GEF project ID:	1358	IMIS number:	GFL-2328-2721-4899
Focal Area(s):	Climate Change	GEF OP #:	OP 6 ⁶⁹
GEF Strategic Priority/Objective:	CC 3	GEF approval date:	17 November 2005
UNEP approval date:	25 April 2006	First Disbursement:	May 2006
Actual start date:	December 2006	Planned duration:	5 years
Intended completion date:	December 2011	Actual or Expected completion date:	December 2012
Project Type:	FSP	GEF Allocation:	\$ 2,950,000 million
Expected MSP/FSP Co-financing:	\$ 4,556,000	Total Cost:	\$7,506,000
Mid-term review/eval. (planned date):		Terminal Evaluation (actual date):	2013
Mid-term review/eval. (actual date):	Not carried out	No. of revisions:	3
Date of last Steering Committee meeting:	December 03 2012	Date of last Revision:	19 June 2012
Disbursement as of 30 June 2013	2,936,600	Date of financial closure:	n/a
Date of Completion:	December 2012	Actual expenditures reported as of 30 June 2013	2,923,379.89
Total co-financing realized as of 31 December:	6.298.457.10	Actual expenditures entered in IMIS as of June 30 2013	2,925,019.74

ACRONYMS

BOT	Build Operate Transfer
CEC	Copperbelt Energy Cooperation
DBZ	Development Bank of Zambia
DOE	Department of Energy
ESCO	Energy services company
GEF	Global Environment Facility
GHG	Green House Gases
IPP	Independent Power Producer
kWh	Kilo-Watt hour
MEWD	Ministry of Energy and Water Development
MTENR	Ministry of Tourism, Environment and Natural Resources

⁶⁹ OP 6 ‘Promoting the adoption of renewable energy by removing barriers and reducing implementation costs’

NREMP	National Rural Electrification Master plan.
OPPP	Office for Promoting Private Power Investment
PV	Photovoltaic
RE	Renewable energy
REA	Rural Electrification Authority
REF	Rural Electrification Fund
RET	Renewable Energy Technology
RRMF	Risk and Replication Management Fund
SAPP	Southern Africa Power Pool
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organisation.
WB	World Bank
ZESCO	Zambia Electricity Supply Company

Project rationale

1 Zambia is a land locked country, bordering the Democratic Republic of Congo and Tanzania in the north, Malawi and Mozambique in the east, Zimbabwe, Botswana and Namibia in the south, and Angola in the west. It has a land area 40 % larger than France but with only 10 million people. About 64 % of the population resides in rural areas.

2 Thanks to its large number of rivers and streams, Zambia has an abundant supply of hydropower, estimated at 6,000 MW and that excludes mini-hydropower. At the date of proposal formulation hydropower provided more than 94 % of the 1,170 MW total power consumption in Zambia (installed capacity is 1,600 – 1,700 MW). In fact Zambia had excess hydro power (about 20 %) of the total power produced) which is exported to neighbouring countries. Location wise, Zambia is strategically positioned in linking the Southern Africa Power Pool (SAPP) with East Africa. Existing power export is made through interconnections with Zimbabwe and the Congo. The planned Zambia-Tanzania-Kenya interconnection will link SAPP with East Africa and beyond and thus open a new market for power export.

3 Despite the abundant hydro resources, only 44 % of the urban population had access to electricity. The utility -ZESCO's coverage in rural areas is much less. Only 2 % of the rural dwellers have electricity supply, mainly because the extension of power grids to many of the widespread rural areas is very expensive and needs to be cross-subsidized by a uniform electricity tariff. Low capital cost diesel generation is often used but due to the high cost of importing and transporting diesel, the generators run for short periods only and electrification does not reach the population quickly. Overall, only 17 % of the country's population has access to electric power; an impediment to economic development.

4 Zambia does have a wealth of renewable resources in the rural areas, which can be harnessed on a sustainable basis. The utilization of these indigenous renewable energy resources (e.g. hydro, solar, biomass) would be a very effective and sustainable alternative for the rural electrification on a decentralized basis. If ZESCO levels the playing field for renewable energy technologies (RETs), they would save substantially on diesel costs and would easily meet the growing energy needs in the rural areas while reducing GHG emissions. In an IPP (Independent Power Producer) market, the lower cost of RETs would make them a preferred choice; where local industries are active, productive uses would result in a willingness to pay the cost of energy production as a niche commercial market.

5 Zambia has already restructured its energy sector and privatization is now being pursued in phases. The modern concepts such as IPPs and Energy Service Companies (ESCOs) are being implemented. The large hydropower sector was opened to private investment with several projects under negotiation. Given the low power grid access and the abundant availability of renewables in rural areas, the options to enhance national energy security in Zambia would invariably include integrated energy policy planning, strengthening of key institutions, diversifying the energy supply by including locally-available renewable resources, and actively involving local communities and private sector focusing mainly on income generation activities.

6 Relevant national policies include a National Energy Policy (1994); an Energy Regulation Act 1995, (amended 2003) under which the Energy Regulation Board was established; a new Electricity Act (1995, (also amended in 2003) that permitted private sector investments in the power sector. The National Energy Policy continues to be

the key document to guide the energy sector development. Its major focus is to promote socio-economic development by an optimum supply and utilization of energy, especially in indigenous forms, while maintaining a safe and healthy environment. It encourages the use of renewables and accords priority to rural electrification.

7 The Zambian Gov't created a Rural Electrification Fund in 1994 with the objective to raise funds for rural electrification. This fund was created by dedicating a percentage of the sales tax on electricity consumption, which changed to a direct levy of 3 % on all power consumption in 1995. In May 1999 the Zambian Gov't created a "Framework and package of Incentives for the Private Sector Participation in Hydropower and Transmission Development". An Office for Promoting Private Power Investments (OPPI) was set up under the Ministry of Energy and Water Development (MEWD) to implement the framework.

8 The Government of Zambia developed a National Rural Electrification Master Plan (NREMP) that focuses on identifying various options for rural electrification for implementation by the Rural Electrification Authority (REA) that was set up on 2003 to facilitate the enhancement of rural access to electricity. REA is committed to be proactive by formulating viable and competitive project proposals and to attain sustainable socio-economic benefit of reliable energy services in the rural areas. One of the elements of this NREMP is to integrate new and renewable energy sources to provide reliable electricity services to rural communities in far flung areas. The goal was to increase rural electricity access from the (then) 2 % rural population to 15 % by 2010.

9 The country context, the overall energy scenario, low penetration of power grid in the rural areas and present alternative to generate electricity through diesel gensets clearly presented an ideal opportunity for GEF to intervene, using abundantly available resources in Zambia: Hydro, Solar and Biomass.

10 The proposed Full Sized GEF Project was in line with national policies and priorities and aimed to support the extensive use of renewable energy technologies as a key element in Zambian Government's rural electrification programme beyond this GEF project. UNEP was to be the Implementing Agency while project execution was entrusted to UNIDO.

11 Detailed feasibility and field studies carried out during the project preparatory phase (PDF-B) identified, evaluated and designed adapted activities to reduce/remove the financial, institutional technical information and human resource barriers hampering the increased use of renewable energy based mini grids and promote investment projects in the renewable energy sector in Zambia. Although the proposed activities focused on addressing barriers and promoting investment projects for renewable energy based mini grids at three different locations, replication activities were to be designed for the implementation of similar projects in the rest of the country as well as in the region. Special efforts are to be made to achieve a win-win situation by supporting renewable energy technologies on a commercial basis thereby ensuring a reduction in their implementation costs, enhancement in investments and improving sustainability for the renewable energy development in Zambia. At every stage of project implementation, local communities (especially women groups) were to be involved to ensure sustainability and local ownership of the project.

12 The project sought to achieve win-win situations by supporting renewable energy technologies based mini grids (Mini Hydro, Solar PV and Biomass Gasification were identified as the most promising RETs) on a commercial basis, thereby ensuring reduction in implementation costs, enhancement in investments in rural electrification and improving the enabling environment to ensure the sustainability of renewables in rural energy projects in Zambia.

GHG Emission Reduction

13 A 1,000 kW biomass gasifier (planned for Kaputa) plus minigrid (generation capacity at 75 %) the amount of CO₂ saved annually would vary between 5,400 and 6,900 tonnes. Assuming an average value, the annual CO₂ savings are expected to be 6,200 tonnes. At Shiwang'andu hydro minigrid, based on the seasonal availability of water, it is expected that up to 6.6 million units are generated annually. This would replace 188,571 litres of diesel (assumption: 1 litre of diesel emits about 3.2 kg of CO₂) thus saving about 6,200 tonnes of CO₂ annually. At Samfya solar minigrid for 36 kWp and a plf of 16-21 % it sums up to 36 kW x 8,760 hrs/year x 0.21 (availability) = 66,225 kWh. Diesel saved is then 18,921 litres, amounting to CO₂ saved 18,921 x 3.2 = 60 tonnes. Annual savings of CO₂ from all three minigrids sums up to around **12,500 tonnes/a**. Total abatement of CO₂ during the service life would come to about **220,000 tonnes** (Mini-Hydro and Solar PV lifecycle assumed at 20 years and biomass minigrid at 15 years).

Project objectives and components

14 The main objective of this project is to address key barriers to the deployment of renewable energy based mini-grids for rural electrification in Zambia. The Renewable Energy Technology's (RET) alternative will displace diesel generation in the baseline thus achieving GHG emission reductions, and also provide a platform for RETs to move into un-electrified rural areas.

15 In line with national priorities, this project should help Zambia to improve its energy security, reduce environmental risks such as over dependence on traditional fuels (i.e. wood & charcoal), and use a more sustainable approach to meet local electricity needs. The project, which primarily aims at removing the key barriers and reducing implementation costs of renewable energy to accomplish this goal, would adopt a holistic approach by including two main components – technical assistance and business models. The technical assistance component would engage activities for barrier removal including strengthening of the enabling environment in terms of policy instruments, capacity building, institutional strengthening and information dissemination to support the wide spread replication and sustainability after the GEF intervention. The increased power supply and reliable energy services in the rural areas will promote income generation activities, which is a key element in the Zambian Government's efforts to eliminate/reduce poverty in the rural areas. The project would aim at setting up of three pilot mini-grids to commercially demonstrate the technical and financial viabilities of using renewable energy technologies for electricity generation as well as for providing reliable services under the respective applicable business models

16 Immediate Objectives:

- To demonstrate, through the pilot minigrids, the technical and financial viability of using renewable energy resources for rural electrification to potential investors, financing institutions, the utility, equipment suppliers, energy service providers and government planning and regulatory officers: Biomass gasification technology demonstration should overcome perceived and real technical risks; Solar PV minigrid should demonstrate an alternate model to solar home systems; and Mini Hydro demonstration (with the least technical risk) with the highest likelihood of broad replication especially considering the follow-on WB project;
- To demonstrate, through these pilot minigrids, the IPP and BOT business models for utilizing each of the three renewable energy resources for rural electrification;
- To set up a public/private project financing mechanism to entice investors, a revolving fund is proposed to share upfront risks for future renewable energy projects. This Risk and Replication Management Fund (RRMF) is to present interest free loans to promote private investments and is to be managed by the Development Bank of Zambia (DBZ).
- To establish a legal, institutional and policy framework to provide a favourable environment for commercial deployment of renewable energy based minigrids in rural areas of Zambia; and
- To build national and local capacity for commercial deployment of renewable energy based minigrids in rural areas of Zambia,

Based on the details available from the field visits, the overall benefits and the national priority, the following sites were selected for setting up of business cum investment models in Zambia under the proposed project:

- A 1,000 kW mini-hydro business model at Shiwang'andu, the Chinsali District;
- A 1,000 kW biomass gasification business model in Kaputa District; and
- A 36 kWp PV business model at Chinsaka in Samfya District (with the inclusion of solar lanterns in luring fish at night).

17 Components⁷⁰/Outputs:

Component 1: **Designing and Establishing Legal, Institutional and Policy Framework**

Output 1.1 An enabling framework in terms of policy, institutional and regulatory mechanisms for supporting renewable energy based minigrids is established and made operational;

Output 1.2 National quality assurance standards on renewable energy technologies and minigrids developed and disseminated;

Output 1.3 Guidelines on environment impact assessment for renewable energy based minigrid project developed and disseminated.

Component 2: **Building National and Local Capacities to Promote Renewable Energy Based Minigrids**

Output 2.1 Main Stakeholders are trained on evaluation and benchmarking of renewable energy minigrid projects for Rural Electrification;

Output 2.2 Key Stakeholders are trained on the management aspects of renewable energy based minigrids;

Output 2.3 Technology experts and policy planners are trained to manage technical and financial services for project appraisals, information dissemination and implementation of replication strategies;

Output 2.4 National Capacities are strengthened to manufacture, assemble and maintain renewable energy based minigrids and the reduction in implementation costs;

Output 2.5 Capacity of financial institutions and banks is built to evaluate renewable energy based rural electrification projects.

Component 3: **Planning and Setting up Innovative Project Financing Mechanisms and Structures**

Output 3.1 An innovative funding mechanism is developed and made operational for supporting renewable energy based business models and their replication. The fund will generally follow DBZ's operational procedures for technical assistance and finance;

Output 3.2 Methodology and procedures are developed for the use of replenished funds for future projects and feasibility studies;

Output 3.3 Capacity of national banks and financial institutions is built to manage investment funds for renewable energy projects.

Component 4: **Implementing Pilot Renewable Energy Based Minigrids to Demonstrate Business Models**

Output 4.1 Three pilot minigrids based on renewable energy technologies are implemented;

Output 4.2 Training is imparted to operational and management staff of the pilot minigrid projects and close linkages between energy services provided by pilot projects and productive use activities established.

Component 5: **Establishing Project Coordination and Management Structures and Dissemination of Information and Lessons**

Output 5.1 Project management team and core experts are identified and recruited and management structures are made operational;

Output 5.2 Capacity building and training of the key stakeholders – technical experts, planners and investors achieved;

Output 5.3 An effective replication strategy and a comprehensive information dissemination programme are developed and implemented;

Output 5.4 Lessons learned and information disseminated and regional networking undertaken;

Output 5.5 Monitoring and close supervision of project operations undertaken en corrective steps taken, wherever needed.

⁷⁰ In the project document these are referred to as 'activities' but here we use the term 'component' as 'activities' normally indicates action taken within in each output.

18 The Risk and Replication Management Fund (RRMF)

A Risk and Replication Management Fund of US \$ 2.0 million is proposed under the project to cover early project development and operating costs to share risk for new investors. The fund, which essentially will be an interest free loan, would cover a part of the investment component that will be taken as a GEF risk sharing contribution to the private investors. After the payback period or when the investment has been recovered, the private investor will have to repay the GEF contribution to a revolving fund at a rate that will not affect his capacity to fulfil his obligations with the final payment and it will be possible to start financing replication activities in the shortest possible period of time. The fund was to be set up at the national level as Risk and Replication Management Fund (RRMF) with the DBZ, which has experience in this area. The design of the RRMF will include legal and contractual measures to avoid inappropriate use of the funds or unnecessary losses. On completion of the project, the RRMF should act as a precursor to a national renewable energy development fund and also pay for the pre-feasibility and feasibility studies on a cost-share basis with private developers for new renewable energy projects in the pipeline. An amount of USD 562,000 was in principle reserved for the small hydro power plant, USD.792,000 was reserved for a Biomass Gasification project and USD.646,000 for a Solar PV.

Table 2. Goal, Outputs and expected outcomes

Global Objective:-

Energy related CO₂ emissions are reduced through promotion of environmentally sound renewable energy technologies based mini- grids for rural electrification in Zambia.

Component	Outcome
1. Designing and Establishing Legal, Institutional and Policy Framework	Strengthened enabling policy, institutional and legal environment for promotion of renewable energy based mini-grids for rural electrification in Zambia.
2. Building National and Local Capacities to Promote Renewable Energy Based Minigrids	Established national capacities for commercial deployment of renewable energy technologies and RE based mini-grids to meet rural energy needs in Zambia.
3. Planning and Setting up Innovative Project Financing Mechanisms and Structures	Financing of RE projects for rural electrification is facilitated.
4. Implementing Pilot Renewable Energy Based Minigrids to Demonstrate Business Models	Addressed barriers that constrain wide spread use of renewable energy technologies in rural areas through business models – pilot RE projects linking with productive use activities.
5. Establishing Project Coordination and Management Structures and Dissemination of Information and Lessons	Implemented a replication and information strategy to promote renewable energy- based mini- grids on commercial basis in rural areas in Zambia.

Source: Project Document 2006

Executing Arrangements

19 UNEP was the Implementing Agency, whose role was to oversee the successful achievement of the project objectives while UNIDO as the Executing Agency was to execute all project activities. The Department of Energy (DoE) under the Ministry of Energy and Water Development was the national counterpart agency with overall ownership and responsibility for guiding the implementation of the project at national level. It should closely coordinate with UNEP and UNIDO for the timely execution of the project activities. The Development Bank of Zambia – a national level financial and banking company to fund developmental projects in Zambia was to assist in managing the Risk and Replication Management Fund (RRMF). UNIDO was to set up a Project management Unit (PMU) expanding the existing national field office to coordinate and execute the project activities. The project coordinator who would be appointed by UNIDO was to report to both DoE and UNIDO for good coordination and timely implementation of the project activities.

20 A Project Steering Committee would be set up to oversee the project implementation under the chairmanship of the Permanent Secretary (PS) of the Department of Energy. This project steering committee would comprise of members drawn from the key Government departments and agencies (including Ministries of Energy and Water Development, Environment, Finance and Industry), REA, ERB, local administration, financial community, public utility, civil society and the private sector. The Department of Energy (DOE) was to approve and notify the PSC, which among other things, would also advise on inter-ministerial coordination and cooperation, besides serving

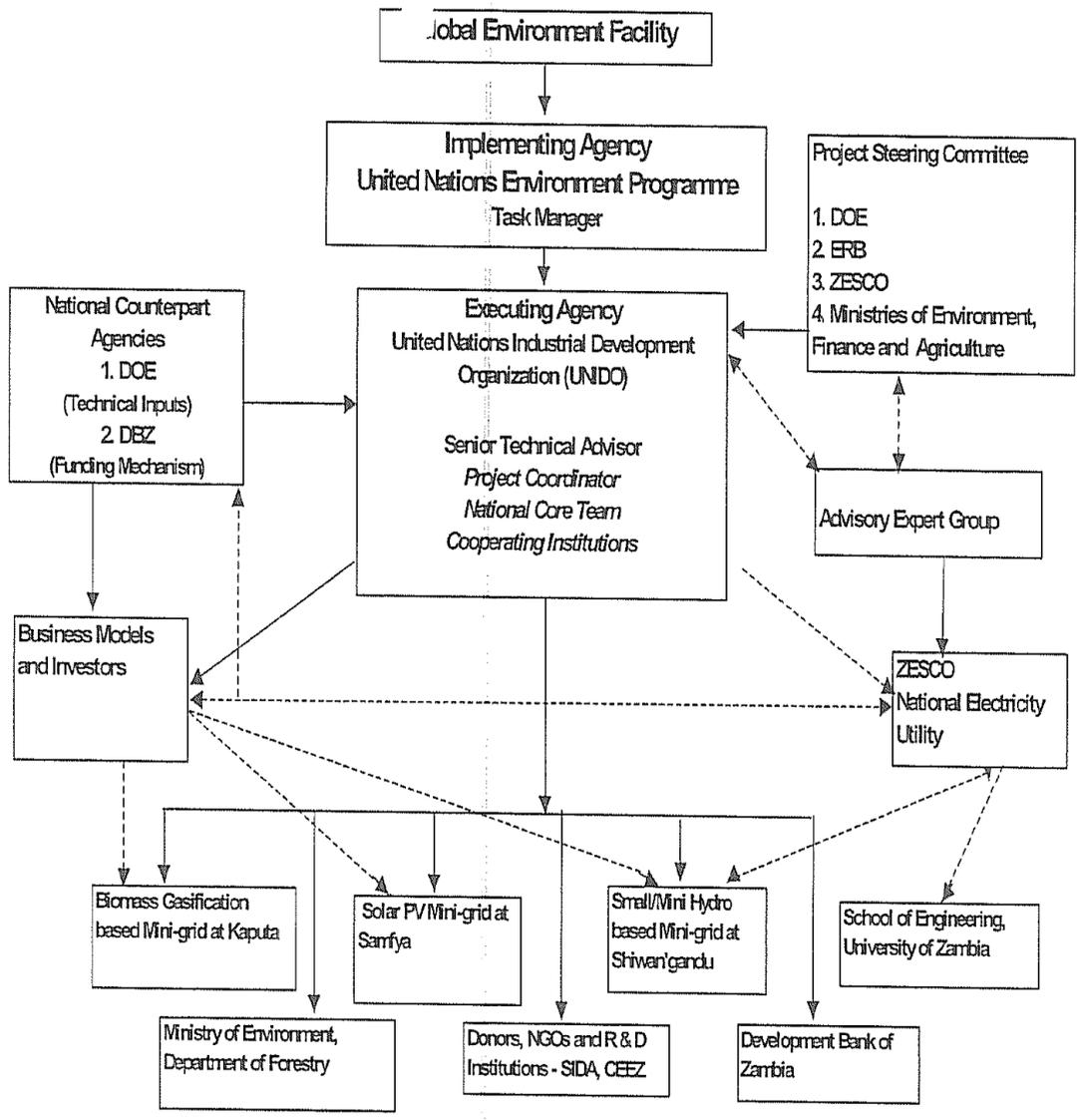
as a platform for sharing information on the project's progress. At the end of the project, this committee would also decide on follow up action. A small group comprising of DoE, DBZ and UNIDO/UNEP would serve as the decision making body (Advisory Committee) for the RRMF proposed under the project and subsequent setting up of a revolving fund.

21 An Advisory Expert Group (AEG) comprising of experts and other key experts and other key stakeholders including local administration, NGOs and local industrial organizations was to be set up, which will be responsible for the replication and coordination of the project activities. This AEG would facilitate public participation in the implementation phase and would ensure local ownership of the project through information dissemination on a regular basis. The AEG should also ensure that all key decisions on location of various facilities under the proposed project were taken after taking into account inputs provided by public representatives, NGOs and local industrial associations. The AEG should assist the PSC at every stage including mainstreaming gender issues into project activities by involving women groups in decision-making processes at every stage.

22 The Risk and Replication Management Fund was proposed to provide interest free loans to attract private investments and meet part of the upfront costs on the civil construction, technology package and contractual costs of the three minigrids proposed. GEF funds would be directed to the renewable energy technology portion while ZESCO (national utility) and others would cover the grid system extensions and the development aspects. The RRMF and grants of interest free loans to minigrids would be coordinated by the DBZ under overall guidance of the National Steering Committee and backstopped by UNIDO. A small group comprising of DoE, DBZ and UNIDO/UNEP would be set up to serve as a decision making body (Advisory Committee) for the RRMF on a day to day basis. However, at the end of the project, overall ownership of the funds at the national level would lie with the Department of Energy at the Ministry of Energy and Water Development of the Gov't of Zambia.

23 Implementation of the project activities would require close monitoring and rigorous evaluation to meet the key objectives. The Project Management Unit would coordinate the project activities and monitor indicators in Zambia for the sustainability and replicability of the project outputs beyond its life. A close supervision and monitoring of indicators for outputs and outcomes would be undertaken jointly by the Department of Energy (DoE) and UNIDO through the project management unit (PMU) to establish global and local benefits accrued from the project.

24 UNEP was to review UNIDO project monitoring reports, and as necessary join Steering Committee meetings.



Project Cost and Financing

25 The total budget for the Full Sized Project was set at US \$ 7.506 million with a GEF contribution of US \$ 2.950 million. Co-funding amounting to US \$ 500,000 from UNIDO, US \$ 50,000 from UNEP, and in cash and in kind contributions amounting to US \$ 1.256 million from the Zambian Government and US \$ 2.750 million from the private sector.

26 The GEF fund was to be split into two – US \$ 2 million to set up the Risk and Replication Management Fund (RRMF) which would provide the interest free loan to assist part financing of the pilot projects and the remaining US \$ 0.95 million (along with funding from other sources) for establishing policy framework, capacity building, technical assistance and project management. The interest free loan was to be paid back into a national level revolving fund to finance additional renewable energy based minigrid projects in the future as part of the replication strategy and plan.

CO-FINANCING

27 UNIDO/UNEP and the Zambia Gov't would contribute US \$ 0.55 million and US \$ 1.256 million to the project respectively. The UNIDO/UNEP funds would be used primarily for the capacity building, innovative financing mechanism, technical assistance and replication. The Zambia Gov't fund would include US \$ 0.256 million in-kind contribution related to water rights, land and other logistical support and US \$ 1.0 million in cash spread over 5 years for national level activities including workshops, study trips, and support to pilot projects. The investors were to invest US \$ 2.75 million to the pilot projects. However, modalities of investor's contribution would be worked out as start up activity under actual project execution, as it would depend upon the Government policy on allowing sole ownership versus joint sector approach by the investors as well as scope and kind of association of ZESCO in these pilot projects.

Financial Summary					
	Cost (K USD)	Zambian Government Contribution	GEF Contribution	UNIDO/ UNEP	Private Investment
Activity 1: Designing and establishing legal, institutional and policy framework for promoting renewable energy based mini-grids in the rural	206.00	56.00	25.00	125.00	0.00
Activity 2: Building national and local capacity to promote renewable energy based mini-grids	1276.00	675.00	326.00	275.00	0.00
Activity 3: Setting up Innovative Project Financing Mechanism	2300.00	250.00	2000.00	50.00	0.00
Activity 4: Implement Business Models – Pilot Mini-Grids at Three Places	3096.00	250.00	46.00	50.00	2750.00
Activity 5: Project Management and Monitoring	628.00	25.00	553.00	50.00	0.00
TOTAL	7506.00	1256.00	2950.00	550.00	2750.00
Percentages (%)		16.7	39.3	7.3	36.6

Implementation Issues

28 After Feasibility Studies in 2007 the financial commitment of the national utility ZESCO covered both the Small Hydro Power in Shiwang'andu as well as a Biomass Gasifier project in Kaputa. The Solar PV project was to be executed by the Rural Electrification Authority (REA). The Small Hydro power plant went ahead, but project development was rather slow. A small gasifier (pilot) unit of 25 kW was installed in Ndola in order to expose ZESCO to this new technology. However, according to the project team, the biogasifier faced serious technical

problems and was out of order for an extended period (possibly due to delays in receiving spare parts). ZESCO was facing financial difficulties in 2010 and proposed to downsize the biomass gasifier project in 2010. According to the project, the delays finally resulted to the town of Kaputa applying for electrification by national grid extension, at which point, the biogasifier was no longer as relevant as at the project design stage. Probably contributed to these events, the decision was taken to establish the biogasifier in another location. Eventually ZESCP decided to pull out of the gasifier project in 2011, the Government of Zambia proposed a new partner, the CEC (Copperbelt Electricity Company) - a private enterprise supplying the mining area with bulk power.

29 At the mid-term stage, with the construction of Hydro project only about to commence, the PV project in the design and contract negotiation phase and the Biomass Gasification project to be executed by the national utility ZESCO, all project funds had already been firmly allocated (and again confirmed) and the development path was sure and committed. Therefore the Task Manager of the Implementing Agency, the Project Director of the Executing Agency as well as the Steering Committee agreed that at that time a Mid Term exercise at that stage would make little sense.

30 As the project faced substantial delays (at the planned project completion date in 2011 only one of the three minigrids was under actual construction), the project was (budget neutrally) extended with one extra year. With all funds for project execution depleted the project closed in December 2012.

31 The project was completed in December 2012 with the official commissioning of the 1MW small Hydro plant in Shiwang'andu. The event was attended by President Sata who has since expressed an interest in replicating this technology in other parts of the country. The GOZ have invested \$1 million USD in investigating the feasibility of 5 additional sites for small hydro power.

32 The solar mini-grid had been completed by REA and was to be commissioned in the coming months. The final capacity was 60 kW, instead of the 36kW initially planned.

33 The biomass mini-grid with a capacity of 1 MW was planned to be completed by CEC by 2014. CEC received 600,000 from the revolving fund and plan to invest a further 6 -7 million dollars in this project. An Indian company, ANKUR, has been selected as the technology provider.

34 The Small Hydro Power plant was developed under auspices of UNIDO's ICSHP, a centre of excellence of UNIDO based in China. The Solar PV component was developed in close cooperation with the ICPV, UNIDO's centre of excellence for Photo Voltaics also based in China.

35 The financial reservation made at the DBZ (GEF funds), amounting to USD 792,000 was to remain available for other Renewable Energy initiatives in Zambia (in a Renewable Energy Fund) under the continued presence of UNIDO. Efforts are being made to attract further donors to contribute to this fund.

II. Terms of Reference for the Evaluation

Objective and Scope of the Evaluation

36 In line with the UNEP Evaluation Policy⁷¹, the UNEP Evaluation Manual⁷² and the Guidelines for GEF Agencies in Conducting Terminal Evaluations⁷³, the terminal evaluation of the Project “**Renewable Energy based Electricity Generation for Isolated Minigrids in Zambia**” is undertaken one year after completion of the project to assess project performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability. The evaluation has two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UNEP, the GEF and their partners. Therefore, the evaluation will identify lessons of operational relevance for future project formulation and implementation. It will focus on the following sets of **key questions**, based on the project’s intended outcomes, which may be expanded by the consultants as deemed appropriate:

- a) Did the project achieve its aim of contributing to the creation of a stronger legal institutional and policy framework to support renewable energy based minigrids in Zambia.
- b) To what extent did the project succeed in building national and local capacities to promote RE based mini grids.
- c) Was the project successful in creating a sustainable funding mechanism to promote investment by PPI in renewable energy.
- d) To what extent did the project succeed in its aim of establishing three pilot minigrids to demonstrate the technical and financial viability of using renewable energy technologies for rural electrification?
- e) Overall, how successful was this project in meeting its goal of reducing barriers to the use of renewable energy technologies for rural electrification in Zambia?

Overall Approach and Methods

37 The terminal evaluation of the Project “Renewable Energy based Electricity Generation for isolated minigrids in Zambia” will be conducted by independent consultants under the overall responsibility and management of the Evaluation Office (Nairobi), in consultation with the UNEP/DTIE GEF Coordination Office (Nairobi), and the UNEP Task Manager at UNEP/DTIE, the project manager and the UNIDO evaluation office.

38 It will be an in-depth evaluation using a participatory approach whereby key stakeholders are kept informed and consulted throughout the evaluation process. Both quantitative and qualitative evaluation methods will be used to determine project achievements against the expected outputs, outcomes and impacts.

39 The findings of the evaluation will be based on the following:

- (a) A **desk review** of project documents and others⁷⁴ including, but not limited to:
 - Relevant background documentation, inter alia UNEP and GEF policies, strategies and programmes;
 - Project design documents; Annual Work Plans and Budgets or equivalent, revisions to the logical framework and project financing;

⁷¹ <http://www.unep.org/eou/StandardsPolicyandPractices/UNEPEvaluationPolicy/tabid/3050/language/en-US/Default.aspx>

⁷² <http://www.unep.org/eou/StandardsPolicyandPractices/UNEPEvaluationManual/tabid/2314/language/en-US/Default.aspx>

⁷³ http://www.thegef.org/gef/sites/thegef.org/files/documents/TE_guidelines7-31.pdf

⁷⁴ Documents to be provided by the UNEP Task Manager are listed in Annex 5.

- Baseline studies, EIAs and feasibility studies for minigrids.
- Project reports such as progress and financial reports from the executing partners to the Project Management Unit (PMU) and from the PMU to UNEP and UNIDO; Steering Group meeting minutes; annual Project Implementation Reviews and relevant correspondence;
- Documentation related to project outputs;
- Monitoring and replication plans
- Review of media articles.

(b) Interviews⁷⁵ with:

- Project management and execution support at UNEP and UNIDO – Vienna and Lusaka;
- UNEP Task Manager and Fund Management Officer (Nairobi);
- The project management units, project teams and technical support including the staff at the UNIDO –PMU, DoE at the Ministry of Energy and Water Development, DBZ, REA, ZESCO, Copperbelt Energy Company (CEC); Forestry department (biogasifier site). Environmental Council of Zambia.
- Relevant staff of GEF Secretariat;
- Representatives of other multilateral agencies and other relevant organisations.
- Key stakeholders (as listed in the project objectives): potential investors, financing institutions, equipment suppliers (ICSHP) , energy service providers, community representatives at mini-grid sites and donor organisations (list of names and contacts to be supplied by the UNIDO project manager).
- Training facilitators from University of Glamorgan and University of Zambia.
- Participants in training courses (graduate engineers).
- Participants in the Agroprocessing course held at Shiwang’andu

- (c) **Country and project site visits.** The evaluator will visit Zambia, including the sites of the completed Mini Hydro (in Shiwang’andu) and Solar PV minigrid (Mpata – Safya District, Luapula Province).

Key Evaluation principles

40 Evaluation findings and judgements should be based on **sound evidence and analysis**, clearly documented in the evaluation report. Information will be triangulated (i.e. verified from different sources) to the extent possible, and when verification was not possible, the single source will be mentioned⁷⁶. Analysis leading to evaluative judgements should always be clearly spelled out.

41 The evaluation will assess the project with respect to **a minimum set of evaluation criteria** grouped in four categories: (1) Attainment of objectives and planned results, which comprises the assessment of outputs achieved, relevance, effectiveness and efficiency and the review of outcomes towards impacts; (2) Sustainability and catalytic role, which focuses on financial, socio-political, institutional and ecological factors conditioning sustainability of project outcomes, and also assesses efforts and achievements in terms of replication and up-scaling of project lessons and good practices; (3) Processes affecting attainment of project results, which covers project preparation and readiness, implementation approach and management, stakeholder participation and public awareness, country ownership/driven-ness, project finance, UNEP and UNIDO supervision and backstopping, and project monitoring and evaluation systems; and (4) Complementarity with the UNEP and UNIDO strategies and programmes. The lead consultant can propose other evaluation criteria as deemed appropriate.

42 **Ratings.** All evaluation criteria will be rated on a six-point scale. However, complementarity of the project with the UNEP, and UNIDO strategies and programmes is not rated. Annex 2 provides detailed guidance on how the different criteria should be rated and how ratings should be aggregated for the different evaluation criterion categories.

⁷⁵ Face-to-face or through any other appropriate means of communication.

⁷⁶ Individuals should not be mentioned by name if anonymity needs to be preserved.

43 In attempting to attribute any outcomes and impacts to the project, the evaluators should consider the difference between **what has happened with** and **what would have happened without** the project. This implies that there should be consideration of the baseline conditions and trends in relation to the intended project outcomes and impacts. This also means that there should be plausible evidence to attribute such outcomes and impacts to the actions of the project. Sometimes, adequate information on baseline conditions and trends is lacking. In such cases this should be clearly highlighted by the evaluators, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgements about project performance.

44 As this is a terminal evaluation, particular attention should be given to learning from the experience. Therefore, **the “why?” question** should be at front of the consultants’ minds all through the evaluation exercise. This means that the consultants needs to go beyond the assessment of “what” the project performance was, and make a serious effort to provide a deeper understanding of “why” the performance was as it was, i.e. of processes affecting attainment of project results (criteria under category 3). This should provide the basis for the lessons that can be drawn from the project. In fact, the usefulness of the evaluation will be determined to a large extent by the capacity of the consultants to explain “why things happened” as they happened and are likely to evolve in this or that direction, which goes well beyond the mere assessment of “where things stand” today.

Evaluation criteria

A Strategic Relevance

45 The evaluation will assess, in retrospect, whether the project’s objectives and implementation strategies were consistent with: i) Sub-regional environmental issues and needs; ii) the UNEP mandate and policies at the time of design and implementation; and iii) the GEF Climate Change focal area, strategic priorities and operational programme(s).

46 It will also assess whether the project objectives were realistic, given the time and budget allocated to the project, the baseline situation and the institutional context in which the project was to operate.

B Achievement of Outputs

47 The evaluation will assess, for each component, the project’s success in producing the programmed results as presented in Table 2 above, both in quantity and quality, as well as their usefulness and timeliness. Briefly explain the degree of success of the project in achieving its different outputs, cross-referencing as needed to more detailed explanations provided under Section F (which covers the processes affecting attainment of project objectives). The achievements under the regional and national demonstration projects will receive particular attention.

C. Effectiveness: Attainment of Objectives and Planned Results

48 The evaluation will assess the extent to which the project’s objectives were effectively achieved or are expected to be achieved.

49 The evaluation will reconstruct the Theory of Change (ToC) of the project based on a review of project documentation and stakeholder interviews. The ToC of a project depicts the causal pathways from project outputs (goods and services delivered by the project) over outcomes (changes resulting from the use made by key stakeholders of project outputs) towards impact (changes in environmental benefits and living conditions). The ToC will also depict any intermediate changes required between project outcomes and impact, called intermediate states. The ToC further defines the external factors that influence change along the pathways, whether one result can lead to the next. These external factors are either drivers (when the project has a certain level of control) or assumptions (when the project has no control).

50 The assessment of effectiveness will be structured in three sub-sections:

- (a) Evaluation of the **achievement of direct outcomes as defined in the reconstructed ToC**. These are the first-level outcomes expected to be achieved as an immediate result of project outputs.
- (b) Assessment of the **likelihood of impact** using a *Review of Outcomes to Impacts* (ROtI) approach as summarized in Annex 8 of the TORs. Appreciate to what extent the project has to date contributed, and is likely in the future to further contribute to changes in stakeholder behaviour as a result of the

project's direct outcomes, and the likelihood of those changes in turn leading to changes in the natural resource base, benefits derived from the environment and human living conditions.

- (c) Evaluation of the **achievement of the formal project overall objective, overall purpose, goals and component outcomes** using the project's own results statements as presented in original logframe (see Table 2 above) and any later versions of the logframe. This sub-section will refer back where applicable to sub-sections (a) and (b) to avoid repetition in the report. To measure achievement, the evaluation will use as much as appropriate the indicators for achievement proposed in the Logical Framework Matrix (Logframe) of the project, adding other relevant indicators as appropriate. Briefly explain what factors affected the project's success in achieving its objectives, cross-referencing as needed to more detailed explanations provided under Section F.

51 There are some effectiveness questions of specific interest which the evaluation should certainly consider:

1. As substantial delays have occurred during 6 years of project implementation, it would be interesting to re-visit the initial risk assessment provided in the original ProDoc and determine the relevance and discrepancies with the reality of project execution and proposed risk mitigation for low overall performance, role of regulators to uphold renewable energy policy guidelines, biomass supply risks, slow project progress, delay in identifying project promoters & sponsors, environmental impact and replicability
2. Did UNIDO's centres of excellence (ICSHP and ICPV) provide effective support to all aspects of project development?

D Sustainability and replication

52 Sustainability is understood as the probability of continued long-term project-derived results and impacts after the external project funding and assistance ends. The evaluation will identify and assess the key conditions or factors that are likely to undermine or contribute to the persistence of benefits. Some of these factors might be direct results of the project while others will include contextual circumstances or developments that are not under control of the project but that may condition sustainability of benefits. The evaluation should ascertain to what extent follow-up work has been initiated and how project results will be sustained and enhanced over time. The reconstructed ToC will assist in the evaluation of sustainability.

53 Four aspects of sustainability will be addressed:

- *Socio-political sustainability.* Are there any social or political factors that may influence positively or negatively the sustenance of project results and progress towards impacts? Is the level of ownership by the main national and regional stakeholders sufficient to allow for the project results to be sustained? Are there sufficient government and stakeholder awareness, interests, commitment and incentives to execute, enforce and pursue the programmes, plans, agreements, monitoring systems etc. prepared and agreed upon under the project?
- *Financial resources.* To what extent is the continuation of project results and the eventual impact of the project dependent on continued financial support? What is the likelihood that adequate financial resources⁷⁷ will be or will become available to implement the programmes, plans, agreements, monitoring systems etc. prepared and agreed upon under the project? Are there any financial risks that may jeopardize sustenance of project results and onward progress towards impact?
- *Institutional framework.* To what extent is the sustenance of the results and onward progress towards impact dependent on issues relating to institutional frameworks and governance? How robust are the institutional achievements such as governance structures and processes, policies, sub-regional agreements, legal and accountability frameworks etc. required to sustaining project results and to lead those to impact on human behaviour and environmental resources?
- *Environmental sustainability.* Are there any environmental factors, positive or negative, that can influence the future flow of project benefits? Are there any project outputs or higher level results that are likely to affect the environment, which, in turn, might affect sustainability of project

⁷⁷ Those resources can be from multiple sources, such as the public and private sectors, income generating activities, other development projects etc.

benefits? Are there any foreseeable negative environmental impacts that may occur as the project results are being up-scaled?

54 **Catalytic role and replication.** The *catalytic role* of GEF-funded interventions is embodied in their approach of supporting the creation of an enabling environment and of investing in pilot activities which are innovative and showing how new approaches can work. UNEP and the GEF also aim to support activities that upscale new approaches to a national, regional or global level, with a view to achieve sustainable global environmental benefits. The evaluation will assess the catalytic role played by this project, namely to what extent the project has:

- *catalyzed behavioural changes* in terms of use and application by the relevant stakeholders of: i) technologies and approaches show-cased by the demonstration projects; ii) strategic programmes and plans developed; and iii) assessment, monitoring and management systems established national and subregional level;
- provided *incentives* (social, economic, market based, competencies etc.) to contribute to catalyzing changes in stakeholder behaviour;
- contributed to *institutional changes*. An important aspect of the catalytic role of the project is its contribution to institutional uptake or mainstreaming of project-piloted approaches in the regional and national demonstration projects;
- contributed to *policy changes* (on paper and in implementation of policy);
- contributed to sustained follow-on financing (*catalytic financing*) from Governments, the GEF or other donors;
- created opportunities for particular individuals or institutions ("*champions*") to catalyze change (without which the project would not have achieved all of its results).

55 *Replication*, in the context of GEF projects, is defined as lessons and experiences coming out of the project that are replicated (experiences are repeated and lessons applied in different geographic areas) or scaled up (experiences are repeated and lessons applied in the same geographic area but on a much larger scale and funded by other sources). The evaluation will assess the approach adopted by the project to promote replication effects and appreciate to what extent actual replication has already occurred or is likely to occur in the near future both at the national and regional level. What are the factors that may influence replication and scaling up of project experiences and lessons?

E Efficiency

56 The evaluation will assess the cost-effectiveness and timeliness of project execution. It will describe any cost- or time-saving measures put in place in attempting to bring the project as far as possible in achieving its results within its programmed budget and (extended) time. It will also analyse how delays, if any, have affected project execution, costs and effectiveness. Wherever possible, costs and time over results ratios of the project will be compared with that of other similar interventions. The evaluation will give special attention to efforts by the project teams to make use of/build upon pre-existing institutions, agreements and partnerships, data sources, synergies and complementarities with other initiatives, programmes and projects etc. to increase project efficiency.

F Factors and processes affecting project performance

57 **Preparation and readiness.** This criterion focuses on the quality of project design and preparation. Were project stakeholders⁷⁸ adequately identified? Were the project's objectives and components clear, practicable and feasible within its timeframe? Were the capacities of executing agencies properly considered when the project was designed? Was the project document clear and realistic to enable effective and efficient implementation? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project implementation? Were counterpart resources (funding, staff, and facilities) and enabling legislation assured? Were adequate project management arrangements in place? Were lessons from other relevant projects properly incorporated in the project design? What factors influenced the quality-at-entry

⁷⁸ Stakeholders are the individuals, groups, institutions, or other bodies that have an interest or stake in the outcome of the project. The term also applies to those potentially adversely affected by the project.

of the project design, choice of partners, allocation of financial resources etc.? Were GEF environmental and social safeguards considered when the project was designed⁷⁹?

58 Project implementation and management. This includes an analysis of implementation approaches used by the project, its management framework, the project's adaptation to changing conditions (adaptive management), the performance of the implementation arrangements and partnerships, relevance of changes in project design, and overall performance of project management. The evaluation will:

- Ascertain to what extent the project implementation mechanisms outlined in the project document have been followed and were effective in delivering project outputs and outcomes. Were pertinent adaptations made to the approaches originally proposed?
- Assess the role and performance of the units and committees established and the project execution arrangements at all levels.
- Evaluate the effectiveness and efficiency of project management and how well the management was able to adapt to changes during the life of the project. How did the relationship between UNIDO and the local project partners (MEWD, ZESCO, REA, CEC) affect project implementation.
- Determine the performance of the local collaborating/executing agencies (UNIDO-PMU, MOWE, ZESCO, REA, CEC).
- Assess the extent to which project management responded to direction and guidance provided by the Steering Committee and UNEP supervision recommendations;
- Identify administrative, operational and/or technical problems and constraints that influenced the effective implementation of the project, and how the project partners tried to overcome these problems.

59 Stakeholder participation and public awareness. The term stakeholder should be considered in the broadest sense, encompassing project partners, government institutions, private interest groups, local communities etc. The TOC analysis should assist the evaluators in identifying the key stakeholders and their respective roles, capabilities and motivations in each step of the causal pathway from activities to achievement of outputs and outcomes to impact. The assessment will look at three related and often overlapping processes: (1) information dissemination between stakeholders, (2) consultation between stakeholders, and (3) active engagement of stakeholders in project decision making and activities. The evaluation will specifically assess:

- the approach(es) used to identify and engage stakeholders in project design and implementation. What were the strengths and weaknesses of these approaches with respect to the project's objectives and the stakeholders' motivations and capacities? What was the achieved degree and effectiveness of collaboration and interactions between the various project partners and stakeholders during design and implementation of the project?
- the degree and effectiveness of any public awareness activities that were undertaken during the course of implementation of the project; or that are built into the assessment methods so that public awareness can be raised at the time the assessments will be conducted;
- how the results of the project (strategic programmes and plans, monitoring and management systems, sub-regional agreements etc.) promote participation of stakeholders, including users, in decision making in the energy sector.

60 Country ownership and driven-ness. The evaluation will assess the performance of government agencies involved in the project with particular attention to the following questions:

- how the national Government and MEWD assumed responsibility for the project and provided adequate support to project execution, including the degree of cooperation received from the various contact institutions in the countries involved in the project and the timeliness of provision of counter-part funding to project activities;
- to what extent the political and institutional framework has been conducive to project performance;
- how responsive the Government was to PMU coordination and guidance, and to UNEP and UNIDO supervision.

⁷⁹ <http://www.thegef.org/gef/node/4562>

61 **Financial planning and management.** Evaluation of financial planning requires assessment of the quality and effectiveness of financial planning and control of financial resources throughout the project's lifetime. The assessment will look at actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co-financing. The evaluation will:

- Verify the application of proper standards (clarity, transparency, audit etc.) and timeliness of financial planning, management and reporting to ensure that sufficient and timely financial resources were available to the project and its partners;
- Appreciate other administrative processes such as recruitment of staff, procurement of goods and services (including consultants), preparation and negotiation of cooperation agreements etc. to the extent that these might have influenced project performance;
- Present to what extent co-financing has materialized as expected at project approval (see Table 1). Report country co-financing to the project overall, and to support project activities at the national level in particular. The evaluation will provide a breakdown of final actual costs and co-financing for the different project components (see tables in Annex 4).
- Describe the resources the project has leveraged since inception and indicate how these resources are contributing to the project's ultimate objective. Leveraged resources are additional resources—beyond those committed to the project itself at the time of approval—that are mobilized later as a direct result of the project. Leveraged resources can be financial or in-kind and they may be from other donors, NGO's, foundations, governments, communities or the private sector.

62 Analyse the effects on project performance of any irregularities in procurement, use of financial resources and human resource management, and the measures taken by UNIDO or UNEP to prevent such irregularities in the future. Appreciate whether the measures taken were adequate.

63 **UNEP supervision and backstopping.** The purpose of supervision is to verify the quality and timeliness of project execution in terms of finances, administration and achievement of outputs and outcomes, in order to identify and recommend ways to deal with problems which arise during project execution. Such problems may be related to project management but may also involve technical/institutional substantive issues in which UNEP has a major contribution to make. The evaluators should assess the effectiveness of supervision and administrative and financial support provided by UNEP including:

- The adequacy of project supervision plans, inputs and processes;
- The emphasis given to outcome monitoring (results-based project management);
- The realism and candour of project reporting and ratings (i.e. are PIR ratings an accurate reflection of the project realities and risks);
- The quality of documentation of project supervision activities; and
- Financial, administrative and other fiduciary aspects of project implementation supervision.

64 **Monitoring and evaluation.** The evaluation will include an assessment of the quality, application and effectiveness of project monitoring and evaluation plans and tools, including an assessment of risk management based on the assumptions and risks identified in the project document. The evaluation will appreciate how information generated by the M&E system during project implementation was used to adapt and improve project execution, achievement of outcomes and ensuring sustainability. M&E is assessed on three levels:

- (a) *M&E Design.* Projects should have sound M&E plans to monitor results and track progress towards achieving project objectives. An M&E plan should include a baseline (including data, methodology, etc.), SMART indicators and data analysis systems, and evaluation studies at specific times to assess results. The time frame for various M&E activities and standards for outputs should have been specified. The evaluators should use the following questions to help assess the M&E design aspects:
- Quality of the project logframe (original and possible updates) as a planning and monitoring instrument; analyse, compare and verify correspondence between the original logframe in the Project Document, possible revised logframes and the logframe used in Project Implementation Review reports to report progress towards achieving project objectives;
 - SMART-ness of indicators: Are there specific indicators in the logframe for each of the project objectives? Are the indicators measurable, attainable (realistic) and relevant to the objectives? Are the indicators time-bound?

- Adequacy of baseline information: To what extent has baseline information on performance indicators been collected and presented in a clear manner? Was the methodology for the baseline data collection explicit and reliable?
- Arrangements for monitoring: Have the responsibilities for M&E activities been clearly defined? Were the data sources and data collection instruments appropriate? Was the frequency of various monitoring activities specified and adequate? In how far were project users involved in monitoring?
- Arrangements for evaluation: Have specific targets been specified for project outputs? Has the desired level of achievement been specified for all indicators of objectives and outcomes? Were there adequate provisions in the legal instruments binding project partners to fully collaborate in evaluations?
- Budgeting and funding for M&E activities: Determine whether support for M&E was budgeted adequately and was funded in a timely fashion during implementation.

(b) *M&E Plan Implementation.* The evaluation will verify that:

- the M&E system was operational and facilitated timely tracking of results and progress towards projects objectives throughout the project implementation period;
- annual project reports and Progress Implementation Review (PIR) reports were complete, accurate and with well justified ratings;
- the information provided by the M&E system was used during the project to improve project performance and to adapt to changing needs.

(c) *Use of GEF Tracking Tools.* These are portfolio monitoring tools intended to roll up indicators from the individual project level to the portfolio level and track overall portfolio performance in focal areas. Each focal area has developed its own tracking tool⁸⁰ to meet its unique needs. Agencies are requested to fill out at CEO Endorsement (or CEO approval for MSPs) and submit these tools again for projects at mid-term and project completion. The evaluation will verify whether UNEP has duly completed the relevant tracking tool for this project⁸¹, and whether the information provided is accurate.

G Complementarities with UNEP strategies and programmes

65 UNEP aims to undertake GEF funded projects that are aligned with its own strategies. The evaluation should present a brief narrative on the following issues:

- *Linkage to UNEP's Expected Accomplishments and POW 2010-2011.* The UNEP MTS specifies desired results in six thematic focal areas. The desired results are termed Expected Accomplishments. Using the completed ToC/ROtI analysis, the evaluation should comment on whether the project makes a tangible contribution to any of the Expected Accomplishments specified in the UNEP MTS. The magnitude and extent of any contributions and the causal linkages should be fully described. Whilst it is recognised that UNEP GEF projects designed prior to the production of the UNEP Medium Term Strategy 2010-2013 (MTS)⁸² would not necessarily be aligned with the Expected Accomplishments articulated in those documents, complementarities may still exist and it is still useful to know whether these projects remain aligned to the current MTS.
- *Alignment with the Bali Strategic Plan (BSP)*⁸³. The outcomes and achievements of the project should be briefly discussed in relation to the objectives of the UNEP BSP.
- *Gender.* Ascertain to what extent project design, implementation and monitoring have taken into consideration: (i) possible gender inequalities in access to and the control over natural resources; (ii) specific vulnerabilities of women and children to environmental degradation or disasters; and (iii) the role of women in mitigating or adapting to environmental changes and engaging in environmental protection and rehabilitation. Appreciate whether the intervention is likely to have

⁸⁰ http://www.thegef.org/gef/tracking_tools

⁸¹ In this case, the GEF mitigation tracking tool

⁸² <http://www.unep.org/PDF/FinalMTSGCSS-X-8.pdf>

⁸³ <http://www.unep.org/GC/GC23/documents/GC23-6-add-1.pdf>

any lasting differential impacts on gender equality and the relationship between women and the environment. To what extent do unresolved gender inequalities affect sustainability of project benefits?

- *South-South Cooperation*. This is regarded as the exchange of resources, technology, and knowledge between developing countries. Briefly describe any aspects of the project that could be considered as examples of South-South Cooperation.

The Consultants' Team

66 For this evaluation, the evaluation team will consist of one team leader and one supporting consultant. The team leader should have a Master's Degree or equivalent in economics or engineering, and have a minimum of 10 years of experience in renewable energy related projects, including evaluation. The consultant should be fluent in spoken and written English. The supporting consultant should have experience in evaluation, a Masters degree or equivalent in a economics, development studies or engineering and country knowledge of Zambia. The Team leader will coordinate data collection and analysis, and the preparation of the main report for the evaluation, with contributions by the supporting consultant. The supporting consultant will be responsible for arranging the logistics of the country visit: setting up appointments, transport and accommodation. Both consultants will ensure together that all evaluation criteria are adequately covered.

67 By undersigning the service contract with UNEP/UNON, the consultants certify that they have not been associated with the design and implementation of the project in any way which may jeopardize their independence and impartiality towards project achievements and project partner performance. In addition, they will not have any future interests (within six months after completion of the contract) with the project's executing or implementing units.

Evaluation Deliverables and Review Procedures

68 The evaluation team will prepare an **inception report** (see Annex 2(a) of TORs for Inception Report outline) containing a thorough review of the project context, project design quality, a draft reconstructed Theory of Change of the project, the evaluation framework and a tentative evaluation schedule⁸⁴.

69 The review of design quality will cover the following aspects (see Annex 9 for the detailed project design assessment matrix):

- Strategic relevance of the project
- Preparation and readiness (see paragraph 25);
- Financial planning (see paragraph 30);
- M&E design (see paragraph 33(a));
- Complementarities with UNEP strategies and programmes (see paragraph 34);
- Sustainability considerations and measures planned to promote replication and upscaling (see paragraph 23).

70 The inception report will also present a draft, desk-based reconstructed Theory of Change of the project. It is vital to reconstruct the ToC *before* the most of the data collection (review of reports, in-depth interviews, observations on the ground etc.) is done, because the ToC will define which direct outcomes, drivers and assumptions of the project need to be assessed and measured to allow adequate data collection for the evaluation of project effectiveness, likelihood of impact and sustainability.

71 The evaluation framework will present in further detail the evaluation questions under each criterion with their respective indicators and data sources. The evaluation framework should summarize the information available from project documentation against each of the main evaluation parameters. Any gaps in information should be identified and methods for additional data collection, verification and analysis should be specified.

72 The inception report will also present a tentative schedule for the overall evaluation process, including a draft programme for the country visit and tentative list of people/institutions to be interviewed.

⁸⁴ Proposed schedule – to be discussed by the team. Preparation of Inception report – before Oct 18th (for feedback before field visit), fieldwork between Oct 27 and Nov 15, draft report by end of November, final report mid December.

73 The inception report will be submitted for review and approval by the Evaluation Office before the evaluator travels to Zambia.

74 **The main evaluation report** should be brief (no longer than 35 pages – excluding the executive summary and annexes), to the point and written in plain English. The evaluator will deliver a high quality report in English by the end of the assignment. The report will follow the annotated Table of Contents outlined in Annex 1. It must explain the purpose of the evaluation, exactly what was evaluated and the methods used (with their limitations). The report will present evidence-based and balanced findings, consequent conclusions, lessons and recommendations, which will be cross-referenced to each other. The report should be presented in a way that makes the information accessible and comprehensible. Any dissident views in response to evaluation findings will be appended in footnote or annex as appropriate. To avoid repetitions in the report, the author will use numbered paragraphs and make cross-references where possible.

75 **Review of the draft evaluation report.** The evaluator will submit the zero draft report latest two weeks after the country visit has been completed to the UNEP EO and revise the draft following the comments and suggestions made by the EO. Once a draft of adequate quality has been accepted, the EO will share this first draft report with the UNEP Task Manager, who will ensure that the report does not contain any blatant factual errors. The UNEP Task Manager will then forward the first draft report to the other project stakeholders, in particular the UNIDO evaluation office, the MEWD, and other stakeholders consulted during the evaluation, for review and comments. Stakeholders may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. It is also very important that stakeholders provide feedback on the proposed recommendations and lessons. Comments would be expected within two weeks after the draft report has been shared. Any comments or responses to the draft report will be sent to the UNEP EO for collation. The EO will provide the comments to the evaluator for consideration in preparing the final draft report.

76 The evaluator will submit the final draft report no later than 2 weeks after reception of stakeholder comments. The team will prepare a **response to comments**, listing those comments not or only partially accepted by them that could therefore not or only partially be accommodated in the final report. They will explain why those comments have not or only partially been accepted, providing evidence as required. This response to comments will be shared by the EO with the interested stakeholders to ensure full transparency.

77 **Submission of the final Mid-term Evaluation report.** The final report shall be submitted by Email to:

Michael Spilsbury, Head
UNEP Evaluation Office
P.O. Box 30552-00100
Nairobi, Kenya
Tel.: (+254-20) 762 3387
Email: michael.spilsbury@unep.org

78 The Head of Evaluation will share the report with the following persons:

Maryam Niamir-Fuller, Director
UNEP/GEF Coordination Office
Nairobi, Kenya
Email: maryam.niamir-fuller@unep.org

Geordie Colville
Division of Technology, Industry and Economics
United Nations Environment Programme
Nairobi, Kenya
Email : Gordie.Colville@unep.org

Peerke de Bakker, Task Manager
Programme Officer, Energy
UNEP/GEF
Email: Peerke.Bakker@unep.org

Diego Masera *Ph.D*
Chief, Rural and Renewable Energy Unit

Energy and Climate Change Branch
UNIDO
P.O. Box 300, A-1400, Vienna, Austria
Tel : 0043 1 26026 3879;
Fax : 0043 1 26026 6803
Email: D.Masera@unido.org

Johannes Dobinger
Evaluation Officer
Evaluation Group/Office of the Director General
UNIDO
P.O. Box 300, Vienna International Centre, 1400 Vienna, Austria (Room D2237)
Tel.: (+43-1) 26026-3369 ; Fax: (+43-1) 26026-6828
E-mail: j.dobinger@unido.org

79 The final evaluation report will be published on the UNEP Evaluation Office web-site www.unep.org/eou. Subsequently, the report will be sent to the GEF Office of Evaluation for their review, appraisal and inclusion on the GEF website.

80 As per usual practice, the UNEP EO will prepare a **quality assessment** of the zero draft and final draft report, which is a tool for providing structured feedback to the evaluation consultants. The quality of the report will be assessed and rated against both GEF and UNEP criteria as presented in Annex 4.

81 The UNEP Evaluation Office will also prepare a **commentary** on the final evaluation report, which presents the EO ratings of the project based on a careful review of the evidence collated by the evaluation consultant and the internal consistency of the report. These ratings are the final ratings that the UNEP Evaluation Office will submit to the GEF Office of Evaluation.

Logistical arrangements

82 This Terminal Evaluation will be undertaken by an independent evaluation consultants contracted by the UNEP Evaluation Office. The consultants will work under the overall responsibility of the UNEP Evaluation Office and will consult with the EO on any procedural and methodological matters related to the evaluation. It is, however, the consultants' individual responsibility to arrange for their travel, visa, obtain documentary evidence, plan meetings with stakeholders, organize field visits, and any other logistical matters related to the assignment. The UNEP Task Manager and UNIDO staff will, where possible, provide logistical support (introductions, meetings, transport etc.) for the country visit, allowing the consultants to conduct the evaluation as efficiently and independently as possible.

Schedule of the evaluation

83 The **contract for the Team Leader** will commence on October 28th 2013 and end on January 31st 2013 (22 days spread over a period of 14 weeks). She will travel to Lusaka (in Oct/Nov 2013). The consultant will submit a draft evaluation report by November 30th 2013. The **contract for the supporting consultant** will commence on October 28th 2013 and end on January 31st 2013 (15 days spread over a period of 14 weeks).

84 Both consultants will be hired under an individual Special Service Agreement (SSA). There are two options for contract and payment: lumpsum or "fees only".

85 **Lumpsum:** The contract covers both fees and expenses such as travel, per diem (DSA) and incidental expenses which are estimated in advance. The consultants will receive an initial payment covering estimated expenses upon signature of the contract.

86 **Fee only:** The contract stipulates consultant fees only. Air tickets will be purchased by UNEP and 75% of the DSA for each authorised travel mission will be paid up front. Local in-country travel and communication costs will be reimbursed on the production of acceptable receipts. Terminal expenses and residual DSA entitlements (25%) will be paid after mission completion.

87 The payment schedule for both consultants will be linked to the acceptance of the key evaluation deliverables by the Evaluation Office:

- Final inception report: 20 percent of agreed total fee
- First draft main evaluation report: 40 percent of agreed total fee
- Final main evaluation report: 40 percent of agreed total fee

88 In case the consultants are not able to provide the deliverables in accordance with these TORs, in line with the expected quality standards by the UNEP Evaluation Office, payment may be withheld at the discretion of the Head of the Evaluation Office until the consultants have improved the deliverables to meet UNEP's quality standards.

89 If the consultants fail to submit a satisfactory final product to UNEP in a timely manner, i.e. within one month after the end date of their contract, the Evaluation Office reserves the right to employ additional human resources to finalize the report, and to reduce the consultants' fees by an amount equal to the additional costs borne by the Evaluation Office to bring the report up to standard.

Annex 2. Evaluation matrix

The evaluation consisted of three parts: Key questions; Specific questions and Highlights/Lowlights

Key Questions

1: Has the project contributed to reduced GHG emissions and what evidence can support of the answer? One stakeholder reported evidence based reduction in GHG in the form of reduced consumption of diesel to power a generator for electricity. Other stakeholders reported possible reduction in the longer run.

2: Has the project contributed to increased rural electrification based on RE mini-grid and what evidence can support the answer? Yes the solar mini-grid reported electrification of just under 500 connections and the Hydro Mini-grid also reported connectivity. There is so far no evidence of additional electrification but Zesco considers to expand the use of Mini-hydro for electrification not necessarily for rural electrification though.

3: Has the project contributed to increase income generation in rural areas and what evidence can support the answer? There are no baselines documenting the income situation before or after the installation of the pilot projects and therefore no evidence to support increased income.

4: Has the project contributed to increased productive end use activities in rural areas and what evidence can support the answer? The inclusion of productive end use was disappointing and largely missed opportunities.

Specific questions

Criterion	Assessment Criteria (all stakeholders to be allowed opportunity to comment and the evaluation report will document the source(s) for scoring).
A. Strategic relevance	HS: Project aligned 100% to GRZ and UNEP and GEF priorities; S: Alignment to some priorities; MS: Alignment with one or two priorities; MU: No clear alignment with priorities; U: Contradicting alignment with priorities; HU: Counterproductive alignment with strategic priorities of GRZ, UNEP and GEF. Questions to unpack the rating: Project relevance with key priorities in Zambia, UNEP, GEF
B. Achievement of outputs	HS: All outputs are achieved 100%; S: Some outputs are achieved 100% and some more than 50%; MS: All outputs are somewhat achieved at least 50%; MS: Some outputs are less than 50%; U: Most outputs are less than 50%; HU: No outputs are achieved and no outputs are over 30% achieved; Questions to unpack the rating: Go through the outputs relevant to the institution and assess achievement based on evidence. Institution to score Detailed discussions related to activities.
C. Effectiveness: Reach objectives and results	Evaluation teams assessment of the rating from below. It is not a simple mathematical summary. If for example the achievement of outcome scores HU the Impact cannot score HS and the effectiveness cannot be MS already because there is no evidence of any outcome and vice versa.
1. Achievement of direct outcomes	HS: All outcomes are achieved 100%; S: Some outcomes are achieved 100% and some more than 50%; MS: All outcomes are somewhat achieved at least 50%; MS: Some outcomes are less than 50%; U: Most outcomes are less than 50%; HU: No outcomes are achieved and no outcomes are over 30% achieved. Questions to unpack the rating: Presentation of outcome and discuss their achievement based on evidence; challenges and how they were overcome; interviewed party to provide rating of achievement
2. Likelihood of impact	HL: Evidence that impact has already been achieved or no-reverse process towards achievement; L: Evidence the some impacts are reached/ within likely reach; ML: Positive signals that impact is achievable; MU: No real indication that the impact(s) are achievable; U: Indication and partly evidence that the pathway to impact might be abandoned. HU: Evidence that the impact(s) are unreachable or abandoned as different processes supersede the intended pathway toward impact. Questions to unpack the rating: Evidence of achievement of overall objective; challenges and options for longer term achievement(s)
3. Achievement of project	HL: evidence of increased uptake of RE mini-grids in rural area and evidence of reduced GHG L: Pilot projects in full capacity operation and evidence of some additional projects under construction or in operation; ML: Pilot projects in operation and strong pipeline of projects under evaluation/construction based on evidence; MU: No tracking of evidence and no evidence of pilot projects or subsequent projects really operating optimal; U: Pilot

goal and planned objectives	projects production to minimal to displace any conventional energy production. HU: evidence that the pilot project are not in operation and no additional projects have been established based on the frameworks established. Questions to unpack the rating: Based on TOC – adjust TOC – discuss achievements based on evidence and obtain rating.
D. Sustain & replicate	Evaluation team to summarise and weigh the answers below.
1. Financial	HL: Evidence that pilot projects will be able to complete repayment of their loans and new loans are taken up for on-lending to financially viable projects; L: Evidence that the pilot projects are repaying their loans and pipeline of new viable projects to take up lending; ML: Evidence that the pilot projects will eventually be able to repay their loans and possible new projects will take up lending; MU: Evidence that the pilot projects have defaulted on payments or it is not clear if additional lending will occur; U: Pilot projects keep falling behind repayment schedule preventing new lending to other projects to be finalised; HU: Pilot projects have stopped repayment and no plan in place for recovery of funds for on-lending; Questions to unpack the rating: To what extend do the pilot projects repay their loans? To what extend is lending to new pilot projects likely based on evidence; Barriers preventing / facilitating financial sustainability at plant level and for on lending
2. Socio-political	HL: Evidence that stakeholders provide full ownership sufficient to fully sustain and continue project and all social and political factors surrounding the project speak in favour of continuation; L: graduation level based on documented socio and political ownership and support and awareness; ML: see above; MU: see above; U: see above; HU: Evidence of no ownership by the main stakeholders to facilitate results can be sustained; Questions to unpack the rating: Are there any socio-political factors that have or may influence the immediate and longer term sustainability and uptake of RE Mini grids? Based on evidence and scoring; Is the level of ownership sufficient to drive the uptake of additional re-mini-grids; Is the level of ownership sufficient to maintain the existing pilot projects
3. Institutional framework (Institutions to be mapped and each evaluated against the matrix)	HL: Evidence those Policies are in place and institutional structures capacitated to handle establishment of RE mini-grid without delays. L: Evidence that policies and structures are in place but not necessarily in use in favour of establishment of mini-grids; ML: Institutional structures in place but resources unclear; MU: Institutional structures and human resources not in place to service establishment of mini-grids; U: Plans but no or insufficient budget released to operate institutional structures for mini-grids; HU: No plans to establish institutional facilities that can be responsible for mini-grids; Questions to unpack the rating: How robust are the required institutional frameworks, structures and processes at national and provincial level to facilitate efficient uptake of RE Mini-grids? This includes manpower, skills and leadership. Evidence based rating ; Cross check answers through interviews with potential investors
4. Environmental	HL: Evidence that mini-grid projects environmental assessment system is in place and in use by authorities that have full capacity to inspect; L: Evidence that assessment system is in place and applied with reasonably due diligence; ML: Evidence that assessment system is in place and possibly used without unnecessary delays to assess and monitor mini-grids. MU: No evidence that existing environmental assessment plans are in use/can be in use because of lack of resources; U: No or few resources available or in use to assess and/or monitor environmental impact; HU: No environmental impact assessment plan approved or in use by national and/or local districts Questions to unpack the rating: Are there environmental factors that can influence the future establishment of RE mini-grids (positive or negative). Are there evidence of environmental impact from the established mini-grids
5. Catalytic role and replication	HL: Evidence that investors have applied for and been granted loans and started to construct solar/hydro mini-grids based on available public results from the pilot projects; L: Updated information about the pilot project publicly available; reasonably updated and pilot sites willing to share information; ML: Some results are accessible and pilot sites willing to share information; MU: Results from the pilots inaccurate; not updated or hard to access; U: Results from the pilots not publicly available.HU: No results from the pilots available and no applied or approved loans for mini-grids based on the pilot models Questions to unpack the rating: Perception and evidence to document if the project has contributed to policy changes towards RE; financial changes towards lending for RE; pricing changes in favour of RE; institutional changes; private investor changes; skills base changes
E. Efficiency	HS: Evidence that project has successfully adopted significant time and saving measures S: Evidence that the project has successfully overcome initial time delays through time and cost savings MS: Evidence that the project and PSC has been mindful to optimise costs and time MU: No evidence that the project/PSC has been structured in an approach to optimise time/ or costs U: Evidence that time/costs have been wasted despite comments from PSC or Partners HU: Evidence of ignorance towards efficiency by project and PSC despite written requests to improve.

	<p>Questions to unpack the rating: Delays and measures to “make up”; cost or time saving measure adopted; did the project make use of already existing practices; processes; did the project share knowledge and practices freely with other programmes/initiatives.</p>
<p>F. Factors affecting performance. Evaluation team to score based on collective assessment of below</p>	
<p>1. Preparation and readiness</p>	<p>HS: Project funds and agreements in place at time of starting project. Recruitment process completed within three months. S: Project funds, agreement and stakeholder mobilisation ready MS: Project funds, agreements and stakeholder mobilisation somewhat in place at initiation; MU: Project funds, agreements and stakeholder mobilisation delayed with 3-6 months after initiation; U: Project funds and agreements incl. stakeholder mobilisation delayed with 6-12 months; HU: Project funds and agreements more than one year to be in place after initiation; Question to unpack the rating: Were the capacities of executing agencies properly considered when the project was designed? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project implementation? Were counterpart resources (funding, staff, and facilities) and enabling legislation assured? What factors influenced the quality-at-entry of the project design, choice of partners, allocation of financial resources etc.?</p>
<p>2. Project implementation and management</p>	<p>HS: Project implementation highly adaptive and effective in delivering results in quality, quantity and within planned/agreed timeframes and budget and full participation of stakeholders and partners. S: - U scored in between with support of detailed questions; HU: Evidence that the project failed implementation by not being adaptive or effective in delivering results mostly below quality, quantity and outside the planned/agreed timeframes and budget and without participation of stakeholders and partners Questions to unpack the rating: To what extent was the project implementation mechanisms outlined in the project document being followed and were they effective in delivering project outputs and outcomes? Were pertinent adaptations made to the approaches originally proposed? How effective and efficient was the project management and how well was management able to adapt to changes during the life of the project? Did project management respond to direction and guidance provided by UNIDO?UNEP supervision recommendations? What administrative, operational and/or technical problems and constraints influenced the effective implementation of the project, and how did project partners try to overcome these problems?</p>
<p>3. Stakeholders participation and public awareness</p>	<p>HS: Stakeholders fully engaged in project design and implementation and constant access to information about progress and results. S: Stakeholders feel satisfied with engagement in the design and implementation and access to information MS: Stakeholders feel moderately satisfied with engagement in the design and implementation and access to information MU: Stakeholders feel moderately dis-satisfied MU with engagement in the design and implementation and access to information U: Majority of stakeholders are dis-satisfied with engagement in the design or the implementation or the access to information HU: Stakeholders provide evidence documenting exclusion from engagement in the design or implementation or access to information. Questions to unpack the rating: How were stakeholders engaged in the project design and implementation. Who did the project collaborate with and is interaction sustainable? What public awareness activities were implemented and rate the effectiveness</p>
<p>4. Country ownership and driven-ness</p>	<p>HS: GRZ has assumed full responsibility for the project and provided adequate support incl. funding for execution, engagement at provincial/ local level and full evidence based engagement of communities and NGO. S: rated for each sub-question in between MS: MU: U: HU: Evidence of systematic lack of GRZ responsibility for the project. No adequate support incl. funding for execution, engagement at provincial/ local level and no engagement of communities and NGO. Questions to unpack the rating: Has GRZ assumed responsibility for the continuation of the project and did GRZ support during implementation. How conducive is the political climate compared to before the project for RE mini-grid based on evidence of change.</p>
<p>5. Financial planning and management</p>	<p>HS: All financial plans and budgets error free at all time; S: Financial plans and budget submitted on time and errors corrected within agreed timeframes; MS: Financial plans and budgets submitted and errors corrected without need for external audit; MU: Financial reports/budgets incomplete and external audit in progress; U: Financial reports and budgets incomplete and recommendations from audit reports not follow up/completed; HU: Financial reports and budgets incomplete and audit outstanding; Questions to unpack the rating: Were financial resources sufficient and timely available to the project? Was recruitment of staff and procurement effective? Did co-financing materialise? Did the project leverage additional resources during project duration and after? Any irregularities affecting the implementation and how were they handled</p>

6. UNEP supervision and backstopping	HS: UNEP has provided good quality supervision in form of practical and realistic monitoring tools, reporting formats and effective financial and administration support S-U at a weighed scale between the unpacked questions and answers. HU: Evidence that that UNEP has lacked supervision and provided poor – contradicting-wrong supervision, un-realistic monitoring tools or reporting formats and in-effective financial and administration support; Questions to unpack the rating: Did the Project receive backstopping from UNEP? Rate the quality. Was there any outcome monitoring? Was there feed-back on project reporting. Evidence of support and backstopping
7. Monitor	Evaluation team to summarise and assess
a. M&E Design	HS: A M&E framework in place at time of project launch and all parties incl. stakeholder have access to the framework ; S: A M&E framework confirmed within 6 months of project operation (inception) and all parties incl. stakeholder have access to the framework; MS: A M&E framework developed before one year of operation and all parties incl. stakeholder have access to the framework; MU: A M&E framework not in place after two years and/or partners and stakeholder have limited access to or information about framework; U: A M&E framework not finalised and/ or partners and stakeholder have no information about framework; HU: No framework designed; Questions to unpack the rating: Could the project logical framework be used as a planning and monitoring tool? Was it used? Did the project develop / use SMART indicators/ were there baseline information? How was the follow up on baseline information?
budgeting and funding for M&E activities	HS: Budgets and funds sufficient to undertake all agreed M&E on time and communicate results to partners and stakeholders; S: Budgets and funds sufficient to undertake regular M&E; MS: Budget and funds sufficient to undertake M&E but not for communication or follow up; MU: Budget and funds partly insufficient to complete M&E; U: Budget or funds delayed with more than 6 months/or documented insufficient to undertake agreed M&E; HU: No budget and no funding available for M&E; Questions to unpack the rating: Were budgets realistic? Were budgets usually kept? Did funding arrive on time? Was funding a barrier for project implementation
c. M&E Plan Implementation	HS: M&E design implemented at agreed intervals, communicated to partners and stakeholders and used to adjust implementation; S: Most of M&E design implemented at agreed intervals, and sometimes communicated to partners and stakeholders and used to adjust implementation ; MS: : Most of M&E design implemented at agreed intervals, and sometimes communicated to partners and stakeholders and partly used to adjust implementation; MU: M&E sporadic and implementation not followed up; U: Hardly any M&E / No evidence that M&E findings have be used to adjust implementation; HU: No M&E implemented Questions to unpack the rating: Did the project prepare reports on time? In agreed quality? Are the reports reflective of the reality? Were they used for anything? Did the project share information based on M&E results? Was there a systematic M&E
Overall rating	Evaluation team to provide overall rating based on assessment of scoring and overall findings

General questions

Each interviewed individual was allowed to share 2 highlights and 2 weaknesses.

The key highlights:

ZESCO's installation and operation of the hydro mini-grid is a significant milestone in Zambia. It is the first electrification project in 3 decades⁸⁵ and it marked a turning point for use of mini-hydro as a tool to add power to the grid as well as for off grid mini-grid. The plant operates with close to zero down time⁸⁶. ZESCO is reported already to have invested around 1 million \$ in feasibility studies for four additional mini-hydro project⁸⁷.

⁸⁵Interview ZESCO; UNIDO; Village members; Village Chief; Users of electricity

⁸⁶Interviews users of hydroelectricity and Hydro Project Manager

⁸⁷Interview UNIDO

The electrification of schools from the Hydro mini-grid has contributed to impressive and significantly improved pass rates for rural school children⁸⁸. One school reported an increase from 60% and already up to 73% in only 9 months. The target of 75% for the year was estimated to be reached as children could study in the evening, they had access to computers and school teachers were more motivated and preferred to stay on as teachers in the remote area only because they had access to TV and computers. There were no longer teacher vacancy at the electrified school.

Key Weaknesses

The under-resourced design of the RE Mini-grid project. The project design was flawed in terms of logic, time and input to achieve private sector involvement in RE mini-grids, replication and engagement of the local manufacturing industry. The experience from the continent is that it takes much longer than 2 years before a robust private sector can play an active role in infrastructure development and broad uptake. It was overly optimistic to believe that the project would deliver visible results of replication and private sector involvement within 4 years and with a budget of less than \$ 3 million. If the project had been designed to deliver some pilot mini-grids to showcase that these technologies can make a difference in the rural electrification debate this entire project could have been evaluated as a success. The technically problematic and unrealistic project design is probably the biggest shortcoming⁸⁹.

The absence of a sustainability plan for the Solar Mini-grid⁹⁰: The absence of payment from electrified households in combination with absence of use of electricity for productive end use (no extra income for the HH to pay for electricity) undermines the direct financial sustainability of the project. Adding to this that the project management has at the time of evaluation not yet clarified significant discrepancies in hardware delivery and performance against the bill of quantity point to a risk of technical failure. Further adding the unfortunate situation where the ownership of the plant places REA in a legally problematic double role is a big concern and collectively this all poses sustainability risks to the project.

⁸⁸Interviews at schools, Hydro Project Manager

⁸⁹Interviews REA, DoE, UNIDO,

⁹⁰Interview Solar Mini-grid project management; hardware supplier; Community; REA; DBZ and ERB

Annex 3. Evaluation Programme

Date Time	Sun 3Nov.	Mo 4 Nov.	Tue 5Nov.	Wed 6 Nov.	Thur 7 Nov.	Fri 8 Nov.	Sat 9 Nov	Sun 10 Nov	Mon 11 Nov.	Tue 5 Nov
08-09		Team meeting 08:30 - 10:00 (stay easy hotel)								
09 - 10:30		Zambia Environment Management Agency (Moono Kanjelesa & C Mwembela)	Department of Environment (Mr Makumba) Meeting with Zesco Representatives (Mr C. Chitundu; Mr.Mandende & Mr Chanda)	Complete travel logistics for Samfya/Solar pilot site	Arrival in Samfya; paid a courtesy call on the Samfya District Commissioner's Office & defined evaluation purpose		Visiting Shiwangandu, interview the beneficiaries: Chief Mukwikile			
11 - 13:30		Forestry Biogasifier (Mr Sangulube)	Zambia Development Bank (Mr. D. Mfula-Manager Mining, Infrastructure and Construction)			Traveling to Shiwang'andu Mini Grid Hydro Power Plant from Samfya District; Stop over for a night in Mpika District.	District Chairman; Shop owner; Head Teachers; & Health Centre,	Travel from Shiwangandu to Lusaka		Departure Lusaka
14 - 15:30	Travel to Lusaka, ZAMBIA	Rural Electrification Authority (Mr Geoffrey Musonda – Chief Executive Officer)	UNZA School of Engineering	Start travel towards solar pilot site	Visiting Mpanta/Solar/ pilot site & Interview beneficiaries & Project Staff	On site at Shiwangandu mini grid hydro power plant; interview project manager; and private sector investor			Energy Regulator Authority	
16 - 17:30										Rural Electrification Authority (Mr Geoffrey Musonda – Chief Executive Officer)

Annex 4. Project expenditure and summary of co-finance

Planned budget by project component activity (from Project Document September 2005).

Summary of financial structure of the project (in Million US \$)

	Total Cost (million USD)	Zambian Government contribution	GEF contribution	UNEP / UNIDO**	Private investment
Activity 1. Designing an institutional, policy and regulatory framework to provide enabling environment to the development of RE based mini-grids	0.206	0.056*	0.025	0.125	0.000
Activity 2. Building local and national capacity to utilize the commercial potential of renewable energy technologies	1.276	0.675	0.326	0.275	0.000
Activity 3. Setting up appropriate financial mechanisms and structures to encourage private sector investment in RE based mini-grids projects	2.300	0.250	2.000 ***	0.050	0.000
Activity 4. Implementation of business models to demonstrate commercial feasibility of RE based mini-grids for electricity generation and productive use	3.096	0.250 ****	0.046	0.050	2.750 *****
Activity 5. Establishment of project management structures for coordination, monitoring and dissemination of results from the project	0.628	0.025	0.553	0.050 *****	0.000
TOTAL	7.506	1.256	2.950	0.550	2.750

* Government of Zambia's in-kind contribution as diverted effort to put a policy framework in place for promoting renewable energy technologies.

** UNIDO in-kind/cash contribution (US \$ 500,000) for activities such as capacity building, study trips and training workshops.

*** GEF funding to set up a RRMF, and to meet costs on capacity building of financial institutions on financial appraisals, contractual obligations and modalities for a revolving fund.

**** Government of Zambia's in-kind contribution to meet costs on land, building and related infrastructure including providing logistics support to the project team and experts.

***** Consultations held with private investors and companies during the PDF-B phase yielded documented results (letters of intent to bid on file).

***** UNEP in-kind contribution (US \$ 50,000) for information dissemination and replication efforts in Africa.

Annex IX
Format for Project Expenditure Accounts for Supporting Agencies

Project statement of allocation (budget), expenditure and balance (Expressed in US\$) covering the period 10/1/2012 to 12/31/2012

Project No.: GFL/2328-2721-4899
Project Title: RENEWABLE ENERGY BASED ELECTRICITY GENERATION FOR ISOLATED M INI-GRIDS IN ZAMBIA
Project 08-May-06 **Project ending:** 31-Dec-12
Commencing:

Agency Name: UNIDO **UNIDO Project No.:** GPZAM06001
Reporting Year: 2012

Object of expenditure by UNEP budget code	Project Budget allocation for year 2012 (2)	Total Cumulative expenditure for previous periods as at 9/30/2012 (3)	Disbursements for present reporting period 10/1/2012 - 12/31/2012 (4)	Unliquidated Obligations for present reporting period 10/1/2012 - 12/31/2012 (5)	Cumulative Expenditure for present reporting period 10/1/2012 - 12/31/2012 (6) = (4+5)	Total Cumulative Expenditure for 2012 as at 12/31/2012 (7) = (3+6)	Unspent Balance of Budget allocation for year 2012 as at 12/31/2012 (8)=(2-3-6)
1101 Project Coordinator(Lusaka) Sub-Total 1100-11XX	23,507.11 23,507.11	16,437.05 16,437.05	7,255.22 7,255.22	(4,672.78) (4,672.78)	2,582.44 2,582.44	19,019.49 19,019.49	4,487.62 4,487.62
1301 Project Assistant Sub-Total 1300-13XX	- -	4,364.23 4,364.23	3,330.52 3,330.52	(3,214.17) (3,214.17)	116.35 116.35	4,480.58 4,480.58	(4,480.58) (4,480.58)
1601 Project Travel(Expert, Govt.official) Sub-Total 1600-16XX	- -	(126.83) (126.83)	(31.06) (31.06)	- -	(31.06) (31.06)	(157.89) (157.89)	157.89 157.89
2201 DBZ Sub-Total 2200-22XX	155,000.00 155,000.00	155,000.00 155,000.00	- -	- -	- -	155,000.00 155,000.00	- -
3301 Meeting/Workshops Sub-Total 3300-33XX	1,336.39 1,336.39	- -	251.79 251.79	- -	251.79 251.79	251.79 251.79	1,084.60 1,084.60
4101 Office Supplies Sub-Total 4100-41XX	- -	1,000.00 1,000.00	(134.61) (134.61)	(1,000.00) (1,000.00)	(1,134.61) (1,134.61)	(134.61) (134.61)	134.61 134.61
4301 Office rental 4302 Maintenance of premises Sub-Total 4300-43XX	23,433.21 - 23,433.21	8,464.29 7,680.36 16,144.65	(109.01) 1,298.07 1,189.06	- 5,801.17 5,801.17	(109.01) 7,099.24 6,990.23	8,355.28 14,779.60 23,134.88	15,077.93 (14,779.60) 298.33
5101 Rental and maintenance of computer equipment 5102 Sundries 2 Sub-Total 5100-51XX	- - -	1,372.79 4,914.36 6,287.15	(659.00) (2,577.88) (3,236.88)	(1,372.79) (658.71) (2,031.50)	(2,031.79) (3,236.59) (5,268.38)	(659.00) 1,677.77 1,018.77	659.00 (1,677.77) (1,018.77)
5301 Communications(telex,phone,fax) 5303 Support Cost Sub-Total 5300-53XX	- 11,350.86 11,350.86	3,388.52 10,124.74 13,513.26	(1,085.29) 80.02 (1,005.27)	(821.01) - (821.01)	(1,906.30) 80.02 (1,826.28)	1,482.22 10,204.76 11,686.98	(1,482.22) 1,146.10 (336.12)
Grand Total	214,627.57	212,619.51	7,618.77	(5,938.29)	1,680.48	214,299.99	327.58

Duly authorized official of supporting organization

Mr. P. Ulbrich, Director, Financial services Branch PSM/FIN

Signed:

P. ULBRICH 13. DEZ. 2013

Date:

12 Dec 2013 *[Signature]*

Co-finance overview submitted by the UNEP

UNEP/GEF REPORT ON PLANNED PROJECT COFINANCE AND ACTUAL COFINANCE RECEIVED (until June 2013)

Title of Project:	Renewable Energy Based Electricity Generation for Isolated Mini Grids						
Project Number:	PMS:GF/4040-05-13			IMIS:GFL/2328-2721-4899			
Name of Executing Agency:	UNIDO						
Project Duration:	From: 4/1/2006			To: 12/31/2012			
Reporting Period:	May 2006 to June 2013						
Source of Cofinance	Cash Contributions			In-kind Contributions			Comments
	Budget original	Budget latest revision	Received to date	Budget original	Budget latest revision	Received to date	
Government of Zambia	1 256 000	1 256 000	350 000			100 000	Contribution in kind is from staff time for Department of Energy and Forestry Department
UNIDO	50 000	50 000	50 000				
Developer Cofinance:-							
ZESCO Ltd	2 046 000	6 650 000	4 150 000				Funds deposited into the Trust Fund.
Rural Electrification Authority	1 000 000	2 200 000	2 200 000				Construction of the transmission line for Shiwangandu mini hydro project
Rural Electrification Authority	247 000	423 000	423 000				REA will develop the solar mini grid. The figure indicated in the budget latest revision column is the figure REA will have to raise on top of the loan they will get from the RRMF
Total	4 599 000	10 579 000	7 173 000	0	0	100 000	

All amounts in US dollars

Name: Diego MASERA

Position: Unit Chief Renewable and Rural Energy Unit, UNIDO

Date: 01-Sep-13

Project Expenditure

RENEWABLE ENERGY ELECTRICITY GENERATION FOR ISOLATED MINI-GRIDS (ZAMBIA)						
GFL-2328-2721-4899/Rev. 2			Revised			
GF/4040-05-13			Budget	Budget	Revised	Previous
			2011	March 2012	Total	
UNEP	UNIDO					
10		PROJECT PERSONNEL				
1100	1700	International Experts				
1101	1701	Project coordinator	29 500,00	-	146.225,21	127 595,50
1102	1702	Nat Technology expert - Biomass	-	-	8 257,54	8 239,59
1103	1703	Nat Tech expert - Solar/small hydro	-	-	0,00	17 000,00
1199		Sub-Total	29 500,00	-	154 482,75	152 835,09
1200	1100	International Experts				
1201	1151	Int expert - biomass	-	-	41 016,00	40 016,00
1202	1152	Int expert - Forestry	-	-	19 799,61	25 000,00
1203	1153	Int expert - Solar	-	-	12 448,76	18 366,00
1204	1154	International expert - Unspecified	-	-	2 813,30	5 000,00
1205	1155	International expert - Fin Mechanism	18 000,00	-	18 000,00	
1299		Sub-Total	18 000,00	-	94 077,67	88 382,00
1300	1300	Administrative support				
1301	1301	Project assistant in Zambia	13 789,87	-	59 539,01	56 539,01
1321	1302	Temp Assistant UNIDO HQ	-	-	2 752,05	2 724,80
1399		Sub-Total	13 789,87	-	62 291,06	59 263,81
1600		Travel (mission costs)				
1601	1501	Project travel	4 000,00	1 000,00	93 020,78	94 045,64
1602	1601	UNIDO Mission	14 838,63	6 000,00	52 677,16	63 677,16
1603	1602	Other personnel cost 3	-	-	16 662,98	
1699		Sub-Total	18 838,63	7 000,00	162 360,92	157 722,80
1999		Component Total	80 128,50	7 000,00	473 212,40	458 203,70
20		SUB-CONTRACTS				
2200		Sub-contracts				
2201	2101	DBZ		-	2 020 000,00	2 020 000,00
2202	2102	Unspecified	-	-		10 000,00
2299		Sub-Total		-	2 020 000,00	2 030 000,00
2999		Component Total		-	2 020 000,00	2 030 000,00
30		TRAINING COMPONENT				
3200		Study Tours				
3201	3201	Study Tours	-	-	54 281,58	76 019,48
3299		Sub-Total	-	-	54 281,58	76 019,48

3300		In-service Training				
3301	3202	Meeting/workshops	3 000,00	1 000,00	35 759,88	33 665,53
3399		Sub-Total	3 000,00	1 000,00	35 759,88	33 665,53
3999		Component Total	3 000,00	1 000,00	90 041,46	109 685,01
40		EQUIPMENT AND PREMISES				
4100		Expendable Equipment				
4101	5305	Office supplies	2 144,71	300,00	13 204,51	9 204,51
4102	5307	Library Acquisitions	-	-	177,56	777,56
4103	4503	Computer Software	2 600,00	-	2 600,00	1 500,00
4120	5306	Unspecified	-	-		2 000,00
4199		Sub-Total	4 744,71	300,00	15 982,07	13 482,07
4200		Non-Expendable equipment				
4201	4501	Computer hardware	-	-	5 275,86	8 550,18
4202	4502	Lusaka Office furniture	-	-	4 354,60	6 940,08
4203	4505	Lusaka Office equipment-Printer		-	1 822,10	1 822,10
4204	4506	Lusaka office equipment- coppier		-	4 822,10	4 822,10
4205	4507	Handheld radio,cellphones	-	-	1 489,20	3 489,20
4206	0	Transport of equipment		-		
4220	4504	4X4 Project vehicle		-	37 313,84	37 313,84
4299		Sub-Total		-	55 077,73	62 937,50
4300		Premises rent				
4301	4301	Office Rental + common service Lusaka	17 000,00	-	61 942,35	46 470,93
4302	4302	Maintenance of premises-Lusaka	7 000,00	-	29 123,34	24 354,30
4399		Sub-total	24 000,00	-	91 065,69	70 825,23
4999		Component Total		300,00	162 125,49	147 244,80
50		MISCELLANEOUS				
5100		Operation & maint of equipment				
5101	5308	Rental/main of computer equipment-Lusaka	3 500,00	-	12 715,84	10 596,47
5102	5309	Maintenance of vehicles	4 264,25	-	20 344,92	20 100,82
5199		Sub-Total	7 764,25	-	44 060,76	30 697,29
5200		Reporting Costs				
5202	5302	Brochures, pamphlets, newsletters	909,09	500,00	1 629,06	2 239,67
5203	5303	Website	-	-		1 000,00
5204	5304	Unspecified	-	-	78,00	1 487,09

5299		Sub-Total	909,09	500,00	1 707,06	4 726,76
5300		Sundry				
5301	5301	Comunications (telex, phone, fax)	3 320,13	1 000,00	22 445,14	21 445,14
5302	4508	Transport of equipment		-	5 122,10	5 122,10
5303	9301	Support cost	13 052,43	1 400,00	140 353,10	140 353,10
5399		Sub-Total		2 400,00	167 920,34	166 920,34
5400		Hospitality				
5401	5501	Hospitality	300,00	200,00	1 932,49	2 522,10
5499		Sub-Total	300,00	200,00	1 932,49	2 522,10
5999		Component Total		3 100,00	204 620,65	204 866,49
99		Grand Total		11 400,00	2 950 000,00	
		Previous Budget (Rev. 1)	46 957,00		2 950 000,00	
		Variance (as at Rev. 2)				

	Mr Richard Chimfumbwe Mr Mark T. Harvey	Primary School In-Charge, Shiwangandu Rural Health Centre Shiwa Safaris: KapishyaHotsprings Lodge (Private Sector)	kapishya@shiwafaris.com	+260977212855 +260976212855 +260976970444 +260977939277
Rural Electrification Authority	Mr. Geoffrey Musonda	Chief Executive Officer/former Project Manager	gmusonda@rea.org.zm	+260977601630
UNIDO	Dr. Diego Masera	Chief - Renewable Energy Unit (Operations)	D.MASERA@unido.org	+43 1 26026 3879
UNEP	Peerke de Bakker	Technical Renewable Energy	Peerke.Bakker@unep.org	
University of Zambia	Dr Ackim Zulu	Lecturer – Electrical and Electronic Engineering	Ackim.zulu@unza.zm	+260975618082
Zambia Bureau of Standards	Isaiah Mulenga	Standards Bureau Officer	imulenga@zabs.org.zm or izaiahjr@yahoo.com	Zambia Bureau of Standards
Zambia Environment Management Agency (ZEMA)	Ms Moono M. Kanjelesa; Mr Constantino Mwembela	Senior Inspector; Inspector	mkanjelesa@zema.org.zm cmwembela@zema.org.zm	+260955753320
ZESCO	Mr Cyprian Chitundu Mr Victor M. Mundende Mr Linus K Chanda	Managing Director Chief Operating Officer Director - Generation	cchitundu@zesco.co.zm vmmundende@zesco.co.zm lchanda@zesco.co.zm	+260966763346 +260977744874 +260974259000

Documents Reviewed:

- Bali Strategic Plan for Technology Support and Capacity-building, United Nations Environment Programme (UNEP), 2004.
- Feasibility study reports
- List of study tours and participants
- List of workshops and participants
- Progress Reports for the Renewable Energy Mini grids Project, Zambia, 2008 – 2010.
- Project Document –
- Endorsement Letters from Heads of Institutions.
- Work Plan, Budgets and Project Extension Documents, 2010 – 2012
- Project Steering Committee Meetings Minutes, 2008 – 2011
- Project Financial Reports, 2007 – 2011
- National Energy Policy, 2008

- Renewable Energy for Sustainable Rural Development in Zambia, UNIDO
- United Nations Development Assistance Framework for the Republic of Zambia
- Zambia Sixth National Development Plan (SNDP)
- Loan documents for Pilot projects from DBZ

1) Zambia Daily Mail, Friday, January 24, 2014 **Luapula Hydro Power Awaits Govt Approval** (CEC has earmarked US\$2 billion for the development of 700 MW⁹¹ hydro power schemes on the Luapula River once the Zambian government approves the project. The feasibility studies for five projects have already been finalised. CEC Managing Director Owen Silavwe made this presentation before the Parliamentary Committee on Economic Affairs, Energy and Labour on Tuesday, 21st January 2014)

2) Zambia Daily Mail, Friday, January 24, 2014 **REA Seeks Private Partner in Solar Power** (REA is seeking private investors to partner with to develop the 420 kW solar power plant in the newly created District of Lunga in Luapula Province. REA Chief Executive Officer Geoffrey Musonda told the Parliamentary Committee on Economic Affairs, Energy and Labour on Tuesday, 21st January 2014 that REA has developed a 60kW solar mini-grid project in Mpanta village in Samfya where public facilities and about 480 households were benefitting. He noted that Lunga District is just across the Luapula River from Mpanta but is in a swampy area to connect pole lines and so a solar plant is a viable option)

3) Sunday Times of Zambia, October 27, 2013, **Investing in REA – Priority, Says Yaluma** (Mines, Energy and Water Development Minister Christopher Yaluma has assured that government will continue investing in the Rural Electrification Authority – REA – to ensure people in rural areas lead a good life. The Minister made this pledge when he commissioned the Mukosa Grid Extension project in Mungwi District, Northern Zambia. This Extension project is one of the 21 that REA has implemented since 2012 across the country.

4) The Post, Friday August 16, 2013, **Kalomo Chiefs Complain over Solar Electrification projects** (Three traditional chiefs [Chikanta, Sipatunyana and Simwatachela] of Kalomo District in Southern province of Zambia have questioned government’s continued support of solar electrification projects for public and private homes in their chiefdoms through REA as opposed to connecting them to the hydro power grid. They contend that the hydro power grid source is within the District’s reach and that the District is heavily involved in agricultural production. The three chiefs presented their grievances to Energy and Water Development Permanent Secretary, Charity Mwansa, and REA Chief Executive Officer, Geoffrey Musonda, in the presence of the Kalomo District Commissioner, Patrick Phiri)

5) The Post, Friday December 20, 2013, **25 Companies Eye Batoka Gorge Project** (Energy and Water Development Permanent Secretary Charity Mwansa announced that 25 companies had expressed interest for the construction of the Batoka Gorge Dam Hydro power project⁹² on the Zambezi River in the Southern province of Zambia. She indicated that a review process of the feasibility study and environmental impact assessment had already taken longer than required and within 6 months the

⁹¹It is noted that a 700MW hydro plant is a large plant and its possible construction cannot be attributed as an outcome of the construction of a 1MW mini-grids. The 700 MW is rather part of the intercontinental grid aimed at transporting power and earning foreign exchange through sale to the Capri Link and others links that have been or might be established.

⁹²This is also a large hydro project and should not be mistaken for a mini-grid

shortlisted companies would be informed)

6) The Post, December 28, 2013, **SIDA to Fund New Study on Electricity production** (Zambia will in the first quarter of 2014 carry out a study of the entire electricity supply industry to establish the true cost of providing power. Energy Regulations Board Executive Director LangiweLungu announced on 27th December 2013 that the study would be funded by the Swedish International Development Corporation Agency (SIDA).⁹³ The study is expected to determine tariffs that are cost reflective for players in the industry to remain viable. It is also meant to inform the development of a 15 year demand forecast and to determine the least cost generation, transmission and distribution expansion plans required to meet the projected load forecast.

⁹³A demand-cost study is the backbone for all countries electricity planning and is not necessarily a reflection of intend to establish rural mini-grids

Annex 6. Assessment of the quality of the Project Design

The most criteria have been rated on a six-point scale as follows: Highly Satisfactory (HS); Satisfactory (S); Moderately Satisfactory (MS); Moderately Unsatisfactory (MU); Unsatisfactory (U); Highly Unsatisfactory (HU).

Sustainability is rated from Highly Likely (HL) down to Highly Unlikely (HU).

Relevance		Evaluation Comments	Prodoc reference
Are the intended results likely to contribute to UNEPs Expected Accomplishments and programmatic objectives?		Yes S	LFA
Does the project form a coherent part of a UNEP-approved programme framework?		Yes S	UNEP website
Is there complementarity with other UNEP projects, planned and ongoing, including those implemented under the GEF?		YES S	UNEP project list
Are the project's objectives and implementation strategies consistent with:	i) Sub-regional environmental issues and needs?	Partly. Electrification Yes Zambia not obliged to set GHG reduction target. S	GRZ web + ProDoc
	ii) the UNEP mandate and policies at the time of design and implementation?	Yes HS	UNEP Website + ProDoc
	iii) the relevant GEF focal areas, strategic priorities and operational programme(s)? (if appropriate)	Yes HS	GEF website + ProDoc
	iv) Stakeholder priorities and needs?	Yes electrification is highly important HS	ProDoc + finance contribution
Overall rating for Relevance		S	
Intended Results and Causality			
Are the objectives realistic?		MU No measure so even displacement of 1 l diesel could be considered success	PRODOC LFA
Are the causal pathways from project outputs [goods and services] through outcomes [changes in stakeholder behaviour] towards impacts clearly and convincingly described? Is there a clearly presented Theory of Change or intervention logic for the project?		U . Outputs – outcomes partly identical. Limited SMART indicators. Limited action plan related to risks/assumptions	PRODOC LFA
Is the timeframe realistic? What is the likelihood that the anticipated project outcomes can be achieved within the stated duration of the project?		U unrealistic plan year 1 esp. to expect investment decisions in year 1	PRODOC LFA
Are the activities designed within the project likely to produce their intended results?		MS partly	PRODOC LFA
Are activities appropriate to produce outputs?		MS in theory yes	PRODOC LFA
Are activities appropriate to drive change along the intended causal pathway(s)?		MU no plan for integration of pathways	PRODOC LFA
Are impact drivers, assumptions and the roles and capacities of key actors and stakeholders clearly described for each key causal pathway?		U no and this together with lack of SMART indicators bring the logic in jeopardy	PRODOC LFA
Overall rating for Intended Results and causality		MU	

Efficiency			
Are any cost- or time-saving measures proposed to bring the project to a successful conclusion within its programmed budget and timeframe?		Project duration extended with 12 months at no costs S	TOR point 28
Does the project intend to make use of / build upon pre-existing institutions, agreements and partnerships, data sources, synergies and complementarities with other initiatives, programmes and projects etc. to increase project efficiency?		Project to be executed by UNIDO who is already in operation in Zambia. S	ProDoC
Overall rating for Efficiency		S	
Sustainability / Replication and Catalytic effects			
Does the project design present a strategy / approach to sustaining outcomes / benefits?		The replication is anticipated via revolving fund. Lack test of concept Communication channels not clear. Approach to remove barriers on an ongoing scale not clear MU	ProDOC Chapter 5
Does the design identify the social or political factors that may influence positively or negatively the sustenance of project results and progress towards impacts? Does the design foresee sufficient activities to promote government and stakeholder awareness, interests, commitment and incentives to execute, enforce and pursue the programmes, plans, agreements, monitoring systems etc. prepared and agreed upon under the project?		Mentioned but not integrated into activities through initiatives to replicate or sustain. MU	ProDoc chapter 2
If funding is required to sustain project outcomes and benefits, does the design propose adequate measures / mechanisms to secure this funding?		Assumes that the revolving fund is sufficient. MS	ProDoc Finance
Are there any financial risks that may jeopardize sustenance of project results and onward progress towards impact?		Repayment of loans; increase in costs can deplete fund.	ProDoc Risks + Finance
Does the project design adequately describe the institutional frameworks, governance structures and processes, policies, sub-regional agreements, legal and accountability frameworks etc. required to sustain project results?		Yes but implementation rests with UNIDO hence the handover is the risk. MS	
Does the project design identify environmental factors, positive or negative, that can influence the future flow of project benefits? Are there any project outputs or higher level results that are likely to affect the environment, which, in turn, might affect sustainability of project benefits?		No S	
Does the project design foresee adequate measures to catalyze behavioural changes in terms of use and application by the relevant stakeholders of (e.g.):	i) technologies and approaches show-cased by the demonstration projects;	MS	
	ii) strategic programmes and plans developed	MS	
	iii) assessment, monitoring and management systems established at a national and sub-regional level	MS	
Does the project design foresee adequate measures to contribute to institutional changes? [An important aspect of the catalytic role of the project is its contribution to institutional uptake or mainstreaming of project-piloted approaches in any		MU	

regional or national demonstration projects]		
Does the project design foresee adequate measures to contribute to policy changes (on paper and in implementation of policy)?	MS	
Does the project design foresee adequate measures to contribute to sustain follow-on financing (catalytic financing) from Governments, the GEF or other donors?	MU	
Does the project design foresee adequate measures to create opportunities for particular individuals or institutions (“champions”) to catalyze change (without which the project would not achieve all of its results)?	MU	
Are the planned activities likely to generate the level of ownership by the main national and regional stakeholders necessary to allow for the project results to be sustained?	MS	
Overall rating for Sustainability / Replication and Catalytic effects	MS	
Risk identification and Social Safeguards		
Are critical risks appropriately addressed?	S	ProDoc
Are assumptions properly specified as factors affecting achievement of project results that are beyond the control of the project?	U Risks reformulated as positive assumptions without SMART monitoring	ProDoc
Are potentially negative environmental, economic and social impacts of projects identified?	S	ProDoC
Overall rating for Risk identification and Social Safeguards	MS	
Governance and Supervision Arrangements		
Is the project governance model comprehensive, clear and appropriate?	Clear but not linked with GRZ work plans hence requires additional GRZ resources for liaison and coordination MS	PRODOC Chapter 7
Are roles and responsibilities clearly defined?	Roles Yes. Responsibilities NO as initiatives seem to stem from Project and not from GRZ MS	PRODOC Annex 4,5, 10
Are supervision / oversight arrangements clear and appropriate?	No. GRZ excluded from signing, supervision and oversight but assumed to be responsible. MU	PRODOC section 4 inst. framework
Overall rating for Governance and Supervision Arrangements	MS	
Management, Execution and Partnership Arrangements		
Have the capacities of partners been adequately assessed?	Not clear in PRODOC	
Are the execution arrangements clear?	Yes but complex, time and resource consuming which disfavor weak developing country structures	
Are the roles and responsibilities of internal and external partners properly specified?	No	
Overall rating for Management, Execution and Partnership Arrangements	MU	
Financial Planning / budgeting		
Are there any obvious deficiencies in the budgets / financial	S Yes	

planning?		
Is the resource utilization cost effective? Is the project viable in respect of resource mobilization potential?	S Yes	
Are the financial and administrative arrangements including flows of funds clearly described?	S Yes	
Overall rating for Financial Planning / budgeting	S	
Monitoring		
Does the logical framework: <ul style="list-style-type: none"> capture the key elements of the Theory of Change for the project? have 'SMART' indicators for outcomes and objectives? have appropriate 'means of verification'? identify assumptions in an adequate manner? 	The LFA capture steps from output TOC not explicit part of document No SMART indicators MoV in place Assumption lack integration with risks and alternatives. Assumption are generic and difficult to address or manage	LFA Annex B in Project Document
Are the milestones and performance indicators appropriate and sufficient to foster management towards outcomes and higher level objectives?	Milestones not SMART i.e assistance provided to DOE in year one. What assistance, why not continue in year two, what change is in place	LFA example output 1
Is there baseline information in relation to key performance indicators?	Baseline not integrated in LFA	ProDoC LFA
Has the method for the baseline data collection been explained?	No. Baseline refer to "many"; "most"; "often".	ProDoc 3.3
Has the desired level of achievement (targets) been specified for indicators of outcomes and are targets based on a reasoned estimate of baseline?	No. Outcome indicator formulated as "growth", RE is included as priority"; "positive attitudes"	ProDoC LFA Annex B
Has the time frame for monitoring activities been specified?	Yes	Annex 9-35
Are the organisational arrangements for project level progress monitoring clearly specified?	Yes.	Annex 9-35
Has a budget been allocated for monitoring project progress in implementation against outputs and outcomes?	Not explicitly	ProDoc Annex 1
Overall, is the approach to monitoring progress and performance within the project adequate?	Lack of SMART indicators hampers effective management and reduce clarity on need for/ when to make adjustments	
Overall rating for Monitoring	MU	
Evaluation		
Is there an adequate plan for evaluation?	Yes. At that time the LFA was used. No ref. to TOC S	ProDoc annex I
Has the time frame for evaluation activities been specified?	Yes S	ProDoc annex I
Is there an explicit budget provision for mid-term review and terminal evaluation?	No. Integrated in Management component MU	ProDoC Annex 1
Is the budget sufficient?	Budget seems insufficient to allow for changes and adjustments. Very tight U	ProDoC Annex 1
Overall rating for Evaluation Plan	MS	

Annex 7. UNEP Evaluation Report Quality Assessment

Evaluation Report Title:

Terminal Evaluation of the UNEP/GEF Project “Renewable Energy-based Electricity Generation for Isolated Mini-grids in Zambia”

All UNEP evaluation reports are subject to a quality assessment by the Evaluation Office. The quality assessment is used as a tool for providing structured feedback to the evaluation consultants. The quality of both the draft and final evaluation report is assessed and rated against the following criteria:

Substantive report quality criteria	UNEP EO Comments	Draft Report Rating	Final Report Rating
A. Strategic relevance: Does the report present a well-reasoned, complete and evidence-based assessment of strategic relevance of the intervention?	Could add more on the links to MTS and Bali Strategic plan <i>Revised and improved</i>	4	4
B. Achievement of outputs: Does the report present a well-reasoned, complete and evidence-based assessment of outputs delivered by the intervention (including their quality)?	Yes <i>Revised and improved</i>	5	5
C. Presentation Theory of Change: Is the Theory of Change of the intervention clearly presented? Are causal pathways logical and complete (including drivers, assumptions and key actors)?	More work needed on TOC to clarify outputs and outcomes <i>Revised and improved</i>	3	3
D. Effectiveness - Attainment of project objectives and results: Does the report present a well-reasoned, complete and evidence-based assessment of the achievement of the relevant outcomes and project objectives?	Need to link this assessment to the TOC. <i>Revised and improved</i>	3	4
E. Sustainability and replication: Does the report present a well-reasoned and evidence-based assessment of sustainability of outcomes and replication / catalytic effects?	More detail needed on institutional, socio-political and financial sustainability and on the significance of the projects catalytic effect <i>Revised and improved</i>	3	5
F. Efficiency: Does the report present a well-reasoned, complete and evidence-based assessment of efficiency?	Ok. More on the adaptation to opportunity provided by the Copperbelt to save the biogasifier project. <i>Revised and improved</i>	4	4
G. Factors affecting project performance: Does the report present a well-reasoned, complete and evidence-based assessment of all factors affecting project performance? In particular, does the report include the actual project costs (total and per activity) and actual co-financing used; and an assessment of the quality of the project M&E system and its use for project management?	No. Much more detail and evidence needed in this section. <i>Revised and improved</i>	2	4
H. Quality and utility of the recommendations: Are recommendations based on explicit evaluation findings? Do recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?'). Can they be implemented?	Recommendations need to be more detailed and specific. <i>Revised and improved</i>	3	5
I. Quality and utility of the lessons: Are lessons	Some very interesting lessons but	2	5

based on explicit evaluation findings? Do they suggest prescriptive action? Do they specify in which contexts they are applicable?	they need to be clarified. Revised and improved		
Other report quality criteria			
J. Structure and clarity of the report: Does the report structure follow EO guidelines? Are all requested Annexes included?	Not yet. Need annexes on evaluation programme, sources of information, bibliography. Consultant CVs Can also insert matrix on project design from inception report. Revised and improved	2	5
K. Evaluation methods and information sources: Are evaluation methods and information sources clearly described? Are data collection methods, the triangulation / verification approach, details of stakeholder consultations provided? Are the limitations of evaluation methods and information sources described?	No Revised and improved	2	5
L. Quality of writing: Was the report well written? (clear English language and grammar)	Some grammatical errors but reasonable overall Revised and improved	5	5
M. Report formatting: Does the report follow EO guidelines using headings, numbered paragraphs etc.	Needs some work but getting there. Revised and improved	3	5
OVERALL REPORT QUALITY RATING		3.1	4.8

Rating system for quality of evaluation reports

A number rating 1-6 is used for each criterion: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, Highly Unsatisfactory = 1

The overall quality of the evaluation report is calculated by taking the mean score of all rated quality criteria.

2. Checklist of compliance with UNEP EO's normal operating procedures for the evaluation process

Compliance issue	Yes	No
1. Were the TORs shared with the implementing and executing agencies for comment prior to finalization?	X	
2. Was the budget for the evaluation agreed and approved by the UNEP Evaluation Office?	X	
3. Was the final selection of the preferred evaluator or evaluators made by the UNEP Evaluation Office?	X	
4. Were possible conflicts of interest of the selected evaluator(s) appraised? (Evaluators should not have participated substantively during project preparation and/or implementation and should have no conflict of interest with any proposed follow-up phases)	X	
5. Was an inception report delivered before commencing any travel in connection with the evaluation?	X	
6. Were formal written comments on the inception report prepared by the UNEP Evaluation Office and shared with the consultant?	X	
7. If a terminal evaluation; was it initiated within the period six months before or after project completion? If a mid-term evaluation; was the mid-term evaluation initiated within a six month period prior to the project/programmes's mid-point?		X
8. Was the draft evaluation report sent directly to EO by the evaluator?	X	
9. Did UNEP Evaluation Office check the quality of the draft report, including EO peer review, prior to dissemination to stakeholders for comment?	X	
10. Did UNEP Evaluation Office disseminate (or authorize dissemination of) the draft report to key stakeholders to solicit formal comments?	X	
11. Did UNEP Evaluation Office complete an assessment of the quality of the draft evaluation report?	X	
12. Were formal written stakeholder comments sent directly to the UNEP Evaluation Office?	X	
13. Were all collated stakeholder comments and the UNEP Evaluation Office guidance to the evaluator shared with all evaluation stakeholders?	X	
14. Did UNEP Evaluation Office complete an assessment of the quality of the final report?	X	
15. Was an implementation plan for the evaluation recommendations prepared?	X	

Comments in relation to any non-compliant issues:

Project was completed in Dec 2011 and the evaluation was initiated in Oct 2012. SSA for consultant started in Jan 2013.

Annex 8. Brief CV of the evaluation team

Category: Team Leader

1. **Family name:** Grøn
2. **First names:** Helene Rask
3. **Date of birth:** 31 07 1959
4. **Passport holder:** Danish
5. **Residence:** Pretoria, South Africa
6. **Education:**

Institution [Date from - Date to]	Degree(s) or Diploma(s) obtained:
Copenhagen School of Economics and Business Administration (Sep. 1983 – June 1986)	Master of Science in Economics with major in: Development studies ; Regional economics; Cooperatives and public-private partnerships.
Copenhagen School of Economics and Business Administration (Sep. 1979 – June 1982)	Bachelor of Economics and Business Administration

7. Key qualifications:

- More than 25 years of worldwide extensive experience in design, appraisal, review, **monitoring, evaluation** and management of development Programmes and Projects. **More than 12 years hand-on experience from the Southern African region.**
- Proven leadership competency in complex working conditions covering a wide range of topics related to economic development and transformation with a special emphasis on **climate change, renewable energy and energy efficiency, rural development and finance mechanisms.**
- Maintaining the **highest standard for integrity and sound public practices** acquired through almost 20 years of practice in Public Administration in Denmark and abroad especially in Asia and Africa. **Distinct qualifications in the management, partnership liaison and stakeholder networking and profound experience in the sustainable energy development agenda.**
- **Capacity building and institutional development** are core competencies also documented through the placing of energy efficiency and renewable energy on the South Africa agenda. Work with a strong focus on holistic development to include cross cutting goals including job creation while establishing and achieving institutional goals.
- **Recent Renewable Energy and Energy Efficiency assignments** include programme design; implementation, **monitoring and evaluation work** in Botswana, Malawi, Namibia, South Africa and Zambia.
- As team leader and project member on international development programming assignments for more than 2 decades solid experience has been gained in working with multicultural teams. Extensive experience working with **multiple donor agencies** including the AFD, Danida, DFID, GiZ, SDC, UNDP, UNEP, UNIDO and the ILO.

8. Employment record

Date from - Date to	Location	Company & reference person (name & contact details)	Position	Description
2006 - -	South Africa	Baobab Legal, Economic and Engineering Solutions cc. Helene Rask Grøn, Manager	Managing Director and senior consultant	Development Consultant mainly preparation of programmes, projects; review and monitoring; Execution of economic development tasks incl. Establishment of national subsidy office for renewable energy, institutional design of energy agency; formulation of policies and strategies related to climate change. Clients include: AfD, Danida, Dfid, SDC, UNDP, UNEP, UNIDO, DoE, dti, Provincial departments, local government; private sector companies.
Oct 2008 – Sep. 2009	Denmark and Baltic Sea	EU Funded Baltic Sea Programme: Bornholms Regions Kommune, Ullasvej 23, 3700 Rønne, Henrik.Eybye.Nielsen@brk.dk	Project Manager	Manage regional Interreg Project between Sweden, Poland, Germany and Denmark titled “Four Corners Heritage” Task included formulation of regional promotion strategy, management of the project and development of indicators for success
August 2001 – Dec. 2005	South Africa	Danida financed Capacity Building in Clean Energy. COWI A/S, Parallelvej 2, Lyngby. Denmark. Niels Bisgaard Pedersen, nbp@cowi.dk or info@cowi.dk	Cheif Technical Adviser	Managing project and activities. Key successes included launch of national 10 year energy efficiency strategy; launch of energy finance and subsidy office and systematic institutional capacity building. Also stakeholder networking. Manage staff and formulation of Terms of Reference Progress reporting and public information.
August 1999 – July 2001	South Africa	EU financed Labour Market Skills development Project. GFA AG no current reference – company merged with other company	Ass. Team Leader and TA	Strategic development and co-ordination of public sector skills development under the LMSDP (Labour Market Skills Development Programme), Manage ST Consultants and support overall management of the EU-funded Programme incl. Development of monitoring tools. Policy formulation and practice testing of policies to facilitate policy practice that is implementable.
January 1996 – Aug. 1999	Denmark, Asia and Africa	Danida, Ministry of Foreign Affairs. Torben T Larsen tllars@um.dk or um@um.dk	Technical Specialist	Technical Specialist responsible for Danida programming in the fields of infrastructure, finance, micro finance and rural development in Asia and Africa. Responsible for soft loans to projects in China, Indonesia, Central Asia and Africa.
August 1992- Dec. 1995	Denmark	Ministry of Industry, Export credit. Mr. Jan VassardSørensen, Director, jvs@ekf.dk or ekf@ekf.dk	Head of Section	Design, implement Business to Business programme between enterprises and banks in Eastern Europe and Denmark; Design and implementation of programme for business development and export promotion for small-scale Danish enterprises; Implement extensive conference programme on “international project finance and project management”; Secretary to the Danish Export Promotion Council, Ministry of Industry;
Jan. 1989 – July 1992	Indonesia	International Labour Organisation. (MattiTerravainen – no current contact details	MATCOM Liaison Officer	Introduction of material and techniques for cooperative management training (MATCOM) including implementation of a great number of training of trainer courses and training of managers in subjects like: Staff management, Financial management, Project management, Work Planning.
Sep 1986 – Dec. 1988	Denmark	Ministry of Industry, Export credit. Mr. Jan VassardSørensen, Director, jvs@ekf.dk or ekf@ekf.dk	Head of Section	Department for claims and recovery. Responsible for Payment of claims to Danish Exporters. International recovery of outstanding debts from international companies. Strategic restructuring of division to improve client relations.

Category: Team Member

1. **Family name:** CHISONGA
2. **First names:** NIXON
3. **Date of birth:** 2 July, 1976
4. **Passport holder:** Zambia
5. **Residence:** Lusaka, Zambia
6. **Education:**

Institution [Date from - Date to]	Degree(s) or Diploma(s) obtained:
University of Cape Town (2009 - 2010), Cape Town, South Africa.	M.Phil (Development Studies)
University of Cape Town (2008), Cape Town, South Africa	BA Honours Degree (Development Studies)
University of Zambia, (2002), Lusaka, Zambia.	B.A Degree – Social Sciences
David Kaunda Technical Secondary Senior School (1993 – 1995), Lusaka, Zambia.	Senior Secondary School Certificate

7. Key qualifications:

Development Issues: Economic Policy, Growth and Development; Design and management of Performance Monitoring and Evaluation; Impact Evaluation; Project Appraisal, Planning and Evaluation; Programme Management and Implementation; Strategic planning; Community participatory and development approaches; HIV/AIDS and community health programme management; Agriculture and Rural Development; Environment and Sustainable Development; Gender and analytical approaches; Household and Housing Issues; Human and financial Administration issues; Strategic Management; Human Resource Management; Industrial Relations; Financial Management and Administration; Business and Programme Development; Leadership; and Training of Trainers' certificate

Research techniques: Preparation of Research/Project/Program and Financial Protocols, household survey methods, evaluation methods and tools, ethnographic techniques, and research/program reporting with strong empirical research and analytical experience using both quantitative and qualitative techniques.

Computer knowledge includes: proficiency in computer skills (i.e. Microsoft Word, PowerPoint, Excel, Internet Search/Use, and including quantitative statistical packages like SPSS, SAS and STATA, and the qualitative analysis package Nvivo).

8 Employment record:

(a) Knowledge and Action Researcher (Zambia) – Consultative Group on International Agriculture Research (CGIAR) under the Country Research Programme (CRP)- Aquatic Agricultural Systems (AAS) – May 2013 to date

This country position concentrates in focus areas of Barotse (Zambezi) flood plain in Western Province (Mongu, Senanga, Lukulu, Kalabo, Sesheke and Shangombo), in the Kafue river basin (Mazabuka, Kafue, Monze, Magoye and Namwala), and the Bangweulu basin (Luwingu and Samfya)

- Manage and work with implementation teams to ensure that the program-of-work is run as action research on how research triggers change;
- Design and Manage implementation of country M&E and information management systems;

(b) Monitoring and Evaluation Technical Specialist – RuralNet Associates Ltd (May 2012 to May 2013)

This position entails monitoring and evaluation (M&E) of development activities and provides government officials, development managers, and civil society with better means for learning from past experience, improving service delivery, planning and allocating resources, and demonstrating results as part of accountability to key stakeholders. Within the development community there is a strong focus on *results*— this helps explain the growing interest in M&E.

(c) National Consultant - National Socio-economic Survey Data and Research Technical Specialist – Food and Agriculture Organisation of the United Nations (FAO) through Ministry of Lands, Natural Resources and Environment under the Integrated Land Use Assessment Project (July 2011 – May 2012)

The Integrated Land Use Assessment Project (ILUA) is supported by the FAO and the Governments of Finland and Zambia. It is implemented through the Department of Forestry. ILUA focuses on assessing forestry and other related resources and land use practices in order to provide up-to-date qualitative and quantitative information on the state, use, management and trends of these resources. The ILUA approach has been implemented since 2000 in other countries like Costa Rica, Guatemala, Philippines, Lebanon, Cameroon and Tanzania to primarily assess forest resources. In Zambia, the approach extended the assessment to agriculture and livestock which created possibilities for analysing the entire land management and use. Phase one (ILUA I) was implemented between 2006 and 2009. Phase two (ILUA II) began in 2010 and is expected to run its full course by 2013

- (d) **Evaluation and Research Capacity Building Specialist – Southern Spring Associates (January - June 2011)**
Southern Spring Associates is a Research and Development firm with a focus in social research, social survey studies, and policy analysis in social sectors like land, agriculture, housing, health and community development, programme evaluations, strategic planning, human development, empowerment approaches and development aid appraisals.
- (e) **Researcher/Lecturer – Social Policy and Economic Research (July 2003 to December 2007)** of the Research and Development Unit at the National Institute of Public Administration (NIPA), a training and educational college/university institution in Zambia. The job purpose was to initiate, coordinate and carry out research and strategic planning, capacity development activities, and develop M & E systems on behalf of clients to enhance the Institute's performance and delivery services.
- (f) **Research and Business Consultant** at R.M Human Resource Consultants from January 2001 – June 2003.