# Promoting renewable energy based mini-grids for rural electrification and productive uses in Chad

## UNIDO GEF Independent Mid-term Review




**Final report**


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# 1 Abbreviations

| | |
|---|---|
| ADER | Agence Developpement Energie Renouvable |
| EU | European Union |
| FI | Financial Institution |
| GEF | Global Environment Facility |
| GHG | Greenhouse gas |
| GoC | Government of Chad |
| hh | Household |
| IA | Implementing Agency (for GEF) |
| kW | Kilowatt |
| kWh | Kilowatt hour |
| M&E | Monitoring and Evaluation |
| MPE | Ministry of Petrol and Energy |
| MTR | Mid-term review |
| MWh | Megawatt hour |
| PCU | Project coordination unit |
| PIR | Project implementation report |
| PM | Project management |
| PSC | Project Steering Committee |
| PV | Photovoltaic |
| QA | Quality Assurance |
| RCE | Request for CEO Endorsement |
| RE | Renewable Energy |
| SME | Small and medium enterprises |
| STAP | Scientific and Technical Advisory Panel of the Global Environment Facility |
| TA | Technical assistance |
| TTA | Tramatecno Ambiental |
| TOR | Terms of Reference |
| UNIDO | United Nations Industrial Development Organisation |
| UNDP | United Nations Development Programme |

# Executive summary

This report presents the findings and recommendations of the Midterm Review (MTR) of the UNIDO GEF Project "Promoting renewable energy based mini-grids for rural electrification and productive uses" (GEF ID: 3959, "the Project"). The project is implemented by the United Nations Industrial Development Organisation (UNIDO). It was approved by the GEF CEO in May 2012, started in June 2012 and is set to run until October 2015.

The key questions of the mid-term review are:

1) To what extent the project is achieving the expected results at the time of the mid-term review, i.e. to what extent the project has promoted renewable energy (solar) based mini-grids in rural areas of Chad;
2) To what extent the project will be able to meets its goals given the available project funds and co-financing i.e. revise project financing commitments and propose any changes in project activities if required.

The overall objective of the project is to avoid greenhouse gas emissions by promoting renewable energy technologies for mini-grid rural electrification for productive uses in Chad. The project is expected to remove the institutional, technical, knowledge and awareness-related barriers to the promotion of a market approach for the development of mini-grid connected renewable energy systems to meet the growing need for access to electricity in rural areas, which is currently met or likely to be met by fossil fuels. In doing this the project consists of three project components (plus monitoring and evaluation):

> ***Component 1.*** Institutional, policy and financial mechanisms: this project component aims at strengthening the policies and regulatory mechanism to effectively promote and support market based development through measures encouraging public-private sector partnership.
>
> ***Component 2.*** Identification of a portfolio of solar PV sites and preparation of feasibility studies.
>
> ***Component 3.*** Technology demonstration and creation of awareness and technical capacities: The project aims to establish around five (5) pilot sites (mainly PV) in off-grid isolated communities on a market-oriented public-private partnership approach.

The MTR was conducted in accordance with internationally recognized professional standards that are applied to GEF project evaluations. The MTR approach has been to design a methodology which allows the project to be reviewed against the UNIDO parameters included in the Terms of Reference. By using these parameters the Reviewer was able to arrive at a consolidated picture of the Project's progress.

The overall rating for the project is "Moderately Satisfactory". The key finding from the review indicates that the Project is on the right track and has made noticeable progress towards expected outputs and outcomes, but it is significantly behind the original schedule. There is a significant risk that the project will not achieve its overall development objectives within the project timeframe. There are a number of significant risks associated with the on-going sustainability of the mini-grids. The largest constraint to achieving all the project results and outcomes, and sustainability, is the budgetary situation with the absence of the remaining co-financing from the government.

The main weakness in the project was in the initial project design which was inconsistent and not well prepared so the project was not ready to implement at the start of the project in June 2012. The strengths have been in the new project management at UNIDO which made realistic amendments to the project design and since then the project management and progress has been satisfactory. Further detail of the key findings is provided below.

## Project design

The original project design is still relevant to the country context and addresses key needs and market barriers to renewable energy and rural electrification in Chad. The Project is timely and fits

well with UNIDO's organizational strengths and priorities – as well as with policy and priorities of the Chad Government.

The three project components and their outlined activities are *generally* highly relevant for addressing the barriers to renewable energy and rural electrification for productive uses. However the specific activities and baselines relating to all three Components were inadequately detailed at the project design stage.

The GEF "Project Results Framework" in the CEO document should detail the Project's objectives, the objectively verifiable indicators, targets, sources of verification and assumptions for each of the project activities, for the project outcomes and overall project impact. However in this case the project results framework provides only a framework for the project outcomes' indicators; i.e. the framework does not provide verifiable indicators and targets for each of the foreseen project activities or outputs. Overall there is a lack of consistency between the description of the project and what was included in the results framework at project design. This lack of clarity makes it difficult to really understand all the expected outputs and outcomes of the project at project design.

The Project design was too optimistic in some of its assumptions – and consequently targets and timeframes – and did not adequately anticipate some implementation risks:

- An assumption in the project design, which was never made explicit, was that the private sector was sufficiently developed, strong and interested in renewable energy investments. However this is not the case and the Chad private sector is weak and there is little knowledge of renewable energy in Chad. Another unstated assumption relates to the ease of operating in Chad. These two (implicit) assumptions meant that the project design under-estimated the challenges (and time) in working in Chad and with engaging with the private sector.
- The other key assumptions, relating to Component 3, are based on the reliance on the feasibility studies carried out at project design. Because these studies were not sufficient robust the size of the systems, energy generated and the number of connections are all overly ambitious; the targets for kW and kWh (in the text not in the results framework) and thus the targets for GHG emissions avoided are therefore not likely to be met within the project. This is a fault of the Project's initial design.
- In addition, project risks identified in the original Project design did not take adequate account of the risks associated with the receipt (or non-receipt) of the co-finance and underestimated the risks associated with oil price falls and technical problems.

Despite some overly optimistic targets, the overall Project's logic is strong though there have been a number of amendments, mainly due to a lack of clarity and consistency in activities described in the project document. No major amendments have been made to the impact or outcome targets but these targets should be revised downwards in line with realistic assumptions.

The project design appropriately allowed for coordination between UNIDO headquarters and the local PCU. The reviewers also believe that the schedule for the project was ambitious since it did not allow for sufficient start-up time, nor for the challenges of working in Chad.

### Effectiveness (overall rating – satisfactory)

Overall, the Project is on the right track and has made noticeable progress towards expected outputs and outcomes, but it is significantly behind the original schedule.

Work under Component 1 has been flexible in line with MPE's requirements and is likely to achieve its objectives by the end of the project. Progress has been made towards meeting the output-level targets to be achieved for Component 2. The main achievements in Component 2 have been the preparation of detailed feasibility studies for five sites and the start of the renewable energy capacity building.

Good progress has been made towards meeting the output-level targets for Component 3. At the time of the MTR two PV-hybrid power plants have been constructed with a total capacity of 80.6 kW

at Mombou and Douguia, and civil works have been carried out at Guelendeng. In Mombou the PV power plant equipment (39.6 kWp), distribution lines and household connections with electricity meters/dispensers to 134 connections have been installed. The plant has been running since June 2014 and 11,200 kWh has been generated which has offset 10 $tCO_{2e}$. At Douguia the distribution lines and connections is starting now and 54 connections are foreseen while construction of the power plant at Guelendeng has just started.

In addition to the technical mini-grids, significant work has been done on the design of appropriate business models for the mini-grids and the establishment of Local Associations and management teams as well as the associated tariff setting and on-the-job training.

There is a significant risk that the project will not achieve its overall development objectives within the project timeframe. The largest constraint to achieving all the project results and outcomes is the budgetary situation with the absence of the remaining co-financing from the government. Numerous and continuous attempts have been made by the UNIDO management to advocate for a transfer of the remaining financial contribution however it is has still not been received by February 2015.

In particular if co-finance does not materialize then the following results will be lower than foreseen: kW installed (112 kW rather than 157 kW), GHG emissions avoided (1590 rather than 2235 $tCO_2$ e), number of connections (219 connections rather than 300 connections).

Overall, it appears that the inputs and outputs by UNIDO and their consultants have been of a high quality and have clearly met the beneficiaries' needs. All stakeholders consulted were very happy with the quality of the work to date. However there have been a few issues, specifically related to the management of expectations and the technical solutions at the mini-grid sites.

There was consensus from all stakeholders that the consultation and collaboration with them had been excellent and inclusive. There is a clear perception from the stakeholders consulted during the MTR that the project is already providing added value.

### Efficiency

The MTR team considers that an appropriate balance between impact and resources has been achieved, and the Project is being efficiently implemented. Although activities are behind schedule, stakeholders interviewed did not raise any serious issues regarding the timing of their delivery.

At the mid-term 70.5 % of the total GEF budget has been spent on technical assistance and investment. 53.4% of the total project budget had been spent by November 2014. This is significantly less than foreseen in the RCE, however, the expenditures to date are in line with the current activities and delays in the project.

### Monitoring and evaluation (Overall rating – moderately satisfactory)

M&E activities were to be based on the Results Framework provided in the CEO document and on an M&E plan to be designed at the outset of the project. However no M&E plan was prepared at the outset and the Results Framework was weak; it included some SMART indicators at outcome level but no indicators are provided for outputs, and not all targets provided are consistent with the activities described plus the baseline is not provided for all the targets. The plan did not meet the requirements set out in the GEF Minimum Requirements for M&E.

In implementation, use of the results framework is limited and there is no formal reporting on the project beyond the PIRs. UNIDO has submitted regular PIRs to the GEF secretariat (June 2013 & June 2014) reporting progress against updated outcome indicators. Although reporting is limited to the PIRs many of the activities that would be included in an over-arching M&E plan have been taking place. The main activities missing are the active use of SMART indicators and formalised reporting of all the activities and outputs against indicators for outcomes and outputs.

### Implementation and Management (Overall rating – satisfactory)

The project was not well prepared and ready to implement at the start of the project in June 2012. In particular there was a lack of consistency and detail in the design of the activities so it would

have been difficult to procure services against the level of detail provided in the RCE. In addition the counterpart resources were not in place at the start of the project, in particular the Government funding.

UNIDO's implementation approach is in line with its approaches on other projects and is appropriate for this project. For the most part the project management has been effective and efficient. UNIDO have clear roles and responsibilities for the HQ and PCU and are adequately resourced for their project management. With this management structure they have started to fulfil their goals in line with those set out in the results framework, although behind schedule. The use of one large sub-contract is also an efficient use of resources and moves some of the risk of implementation to the sub-contractor, TTA. However communication break-downs between the PCU and Vienna HQ and the lack of availability of local co-ordination at times has resulted in more Vienna HQ management time in phone calls and chasing up (adding an extra step in overall management) which implies a lack of efficiency.

### Sustainability (Overall rating – moderately unlikely)

Overall it is the Reviewer's opinion that the Project could have significant sustainable impacts on the market for renewable energy and mini-grids beyond the duration of the Project. The mini-grids and business models are able to show that electricity access can be sustainable in rural communities. Demonstrating what is possible in terms of technical viability and new business models has the potential to increase the interest in renewable energy, to impact on rural electrification policy and to commit resources to new mini-grids. Added to this are the benefits due to building local capacity in government and the private sector to allow for ongoing project identification and design and supportive legislation.

However there are a number of significant risks associated with the on-going sustainability of the mini-grids, particularly financial risks due to the reduced revenues being collected at site (at Mombou) which means that there are not enough funds to cover the cost of future replacements. In addition the lack of co-finance means there is a significant risk that no operator will take on the management and maintenance for just three sites due to the lack of economies of scale. The sustainability of the business model proposed will be partly dependent on an increase in the number of mini-grids to ensure that there is sufficient viability to attract a private sector actor to maintain and operate the systems. Without clear commitment from Government to roll out these systems the long-term sustainability is limited.

## Recommendations

Recommendations on **project design** include:

1 It is recommended that a new Project Results Framework is prepared which reflects the amended activities and targets and includes SMART indicators for each output and outcome. Realistic targets should be allocated to each indicator in the revised Project Results Framework for two scenarios – one with co-finance and one without co-finance.

2 It is recommended to set a final deadline of 27th March 2015 for funds to come through from the Government.

3 If the finance arrives then the Project would need to be extended by at least six months to March 2016. For the use of GEF funds beyond October 2015, this will require an official request to the GEF Secretariat by UNIDO.

4 If the co-financing does not come through, the project should still complete by October 2015.

5 Without co-finance UNIDO must identify and finalise the activities to be completed in the next months. This should include at least two more additional training sessions, responding to some of the requests from the pilot communities, identifying and training an operator, empowering and training ADER and carrying out some awareness and dissemination activities.

Recommendations on **project implementation** include the following:

6 **Improve reporting, learning and dissemination** through the use of the results framework, the development of systems to track project design changes and to capture lessons learned, develop a communication matrix, explicitly track risks associated with technical solutions, security and oil prices since these have all shown to be more important than assumed at the design stage, or in subsequent PIR reporting.

7 Greater public awareness is needed of the project to help with replication and therefore sustainability. UNIDO should assess whether to add some awareness raising activities with the final months of the project. Donors' logos should be put on all applicable materials (including reports and presentations and on boards at project sites).

A number of recommendations relate to the sustainability of the impacts and further mitigation measures that can be implemented in the final months of the project to **improve the likelihood of sustainability**.

8 The process of identifying future demonstration site operators needs to start now. This process needs to review the prospects of private sector actors taking on the management as well as the possibility of community owned business models.

9 Work with ADER to increase their role and ownership of RE mini-grids in the country. It is recommended that ADER take on a role of supervision of the mini-grid management (under any of the above business models) and ADER work to identify future sites for project replication. This supervision role will differ depending if the private sector or community model is taken forward; with greater ADER involvement under the community model – similar to the management of the community based water management systems already in place in Chad. Training needs should be identified and delivered and ADER could already review closely how TTA carries out the management and O&M.

10 To improve the financial sustainability at the demonstration site level it is important to identify other potential electricity users to increase the revenues.

**Component specific**

11 Ensure the private sector is engaged in the consultation process for the legal component of the work.

12 Consultation should be carried out with the stakeholders to identify their priorities for the next training sessions. This needs to happen as soon as possible to ensure it can take place within the project timescale.

13 Communication of expectations at demonstration sites needs to improve for the remaining Phase 1 sites and also for Phase 2, with respect to timing, tariffs, pre-payment systems, street lights, connections and distribution lines.

14 To ensure continued buy-in from the community and to enhance sustainability it would be worthwhile to implement some of their suggestions and to provide some additional training. In particular this relates to security lighting around the Mombou power site, increasing the street lighting to that foreseen at feasibility, providing additional training to the management team on the whole system and to the local associations on their various roles

**Lessons learned**

1 Clear communication is very important to manage expectations and avoid future misunderstandings.

2 Adaptive management has worked well to date and allowed the project to be flexible.

3 Build in project start-up time into project design.

4 Allow for realistic timing and a thorough understanding of the challenges to doing business in the target country.

5 Greater level of detail and study is required at the PPG stage.

6 Include in-kind co-finance and be realistic about country's ability to commit cash.

7 Ensure co-finance is available at the start of the project.

8 In remote undeveloped areas a more holistic approach is needed to ensure delivery of all the potential impacts – for example electricity alone will not develop productive activities if there is also a need for awareness raising and micro-finance to set up businesses. Alternatively where productive activities are key to sustainability choose only those sites where productive activities can be assured.

# 1 Review objectives, methodology and process

## 1.1 Introduction

This report presents the findings and recommendations of the Midterm Review (MTR) of the UNIDO GEF Project "Promoting renewable energy based mini-grids for rural electrification and productive uses" (GEF ID: 3959, "the Project"). The project is implemented by the United Nations Industrial Development Organisation (UNIDO) and began with the approval of the Project Identification Form (PIF) in 2010. It was approved by the GEF CEO in May 2012, started in June 2012 and is set to run until October 2015.

The mid-term review was carried out in December 2014 and January 2015 with a field visit to Chad between 20-27th January 2015. The time frame of review covered by the Mid-Term Review includes the period starting project start in June 2012 to January 2015. The Mid-Term Review was conducted by Rebecca Gunning (International consultant, team leader), and Mr Djbrine Ngarmig-Nig (National Consultant). This draft report is being submitted to UNIDO, MPE and project partners for review and comment. Comments and suggestions made by these organisations will be taken into account in the finalisation of the Mid-Term Review Report.

## 1.2 Scope and objective of the review

The UNIDO GEF Mid-term Review (MTR) of the Project has been undertaken in accordance with UNIDO Evaluation Policy, the UNIDO Guidelines for the Technical Cooperation Programmes and Projects and the GEF M&E Policy[1]. The MTR will be submitted to the GEF as part of the annual reporting function during the FY2014 reporting cycle.

The MTR has assessed the project's performance and progress against the OECD DAC evaluation criteria: relevance, effectiveness, efficiency, sustainability and impact. As set out in the TOR the assessment will enable the Government, counterparts, GEF, UNIDO and other stakeholders to:

(a) Verify prospects for development impact and sustainability, providing an analysis of the attainment of global environmental objectives, project objectives, delivery and completion of project outputs/activities, and outcomes/impacts based on indicators. The assessment includes re-examination of the relevance of the objectives and other elements of project design.
(b) Enhance project relevance, effectiveness, efficiency and sustainability by proposing a set of recommendations with a view to ongoing and future activities until the end of project implementation.
(c) Revise the project outcomes according to the available resources and time.

The key questions of the mid-term review are:

3) To what extent the project is achieving the expected results at the time of the mid-term review, i.e. to what extent the project has promoted renewable energy (solar) based mini-grids in rural areas of Chad;
4) To what extent the project will be able to meets its goals given the available project funds and co-financing i.e. revise project financing commitments and propose any changes in project activities if required.

The scope of the MTR includes examining the following areas of the project:

- Project design;

[1] http://www.thegef.org/gef/sites/thegef.org/files/documents/ME_Policy_2010.pdf

- Implementation; and
- Outcome/Achievement of Project Objectives.

## 1.3 Information sources and availability of information

UNIDO has made available all the relevant project documentation including the project document, the progress reports, consultants' reports, and minutes of PSC meetings, project deliverables and financial reports. In general, the availability of information for evaluation purposes was good. Reports on project activities were mixed with only detailed information available on the demonstration site development. A list of the documents received is included in Annex 4.

## 1.4 Mid Term Review approach, methodology and limitations

The MTR was conducted in accordance with internationally recognized professional standards that are applied to GEF project evaluations. The MTR approach has been to design a methodology which allows the project to be reviewed against the UNIDO parameters included in the Terms of Reference:

- **A & B. Project Design and Relevance** – referring to GEF Project's relevance to the environmental priorities at local, national and local levels;
- **C. Effectiveness** – referring to the achievement or likelihood of achieving an objective;
- **D. Efficiency** – referring to the balance between impact and financial resources expended;
- **E. Sustainability** – the potential of positive impacts to outlast the GEF Project beyond their completion;
- **F. M&E systems** – an assessment of the M&E design, implementation and budgeting and funding;
- **G. Monitoring long term changes** – referring to the extent to which long-term monitoring is incorporated into project;
- **H. Achievement of results** – referring to issues and processes affecting the achievement of project results (and here included in the other sections)
- **I. Project co-ordination and management**;
- **J. Assessment of gender mainstreaming**; and
- **K. Procurement issues**.

The methodology chosen for this assignment included the following steps:

a) **Development of an evaluation matrix**. The evaluation matrix is a tool for evaluating a project's progress by breaking down the elements of the project against the UNIDO parameters using a set of review questions. The evaluation matrix developed served as a framework for the subsequent stages of the review.

b) **In-depth desk review**. Desk review and analysis of all (available) project documentation;

c) **Site visit and stakeholder interviews** – including preparation of field visits and interviews, and follow-up interviews and requests for clarification from stakeholders and UNIDO staff/ consultancy firms as necessary. Interviewees included:

   i. UNIDO project management;

   ii. Government Stakeholders;

   iii. Consulting teams supporting the project;

   iv. Beneficiaries (of electricity access and training and other support);

d) **Drafting the MTR** report based upon the information gathered including analysis of findings;

e) **Review of the Draft Report** - following the initial internal review, the Draft Report will be made available to relevant staff at UNIDO for scrutiny, feedback and comments.

A full list of the documents reviewed and of the stakeholders consulted during the MTR are provided in Annex B and A respectively. A copy of the evaluation matrix is presented in Annex C.

Following comments and review from UNIDO counterparts a Final Report (with GEF Tracking tool) will be submitted.

This MTR approach and methodology has allowed for different opportunities to engage with stakeholders at various levels and allows for verification of information through triangulation. One of the limitations has been that due to recent changes in key government level staff the newly appointed staff are not fully informed yet of the project. Another limitation relates to the change in UNIDO management since the project design and the previous project manager is not available to interview.

Following this approach and using the review parameters listed, the Reviewers arrived at a consolidated picture of the Project's progress since its start in June 2012, until the timing of the MTR in January 2015.

# 2 Context and project background

## 2.1 Project context

Chad is rich in natural resources yet it is one of the poorest countries in the world, classified by the 2013 Human Development Index (HDI) at 184 out of 187 countries. Energy consumption is very low (estimated at 292 kg of oil equivalent per capita in 2005) and as much as 90 % of the country's total energy consumption comes from traditional sources of energy, such as fuelwood. The Sustainable Energy for All 2010 baseline reports national electricity access at 4% broken down into 15% of the population with electricity access in urban areas and 0% access in rural areas. Only 16 of the 84 towns in Chad have an electricity network.

Lack of access to electricity limits social and economic development in Chad and limits investment and growth in productive sectors. The Chad government fully recognises this and has set, as one of its key development policy objectives, the need to ensure the reliable and adequate supply of energy. However to date there has been little investment in rural electrification which faces a number of institutional, economic and awareness related barriers.

Most of the existing electricity generation is based on fossil fuels. This reliance on fossil fuels for electricity generation results in relatively high greenhouse gas (GHG) emissions. Chad has significant renewable energy resources and renewable energy offers a clean alternative to fossil fuel dependent electricity generation. Not only are the on-going operation and maintenance costs significantly lower than the fossil fuel based systems they could replace, they also result in avoided GHG emissions and less reliance/exposure to volatility in the international oil markets. Renewable energy is particularly suitable for rural areas where the existing grids, do not currently, and will not reach in the near future and where renewable energy can provide the least cost energy supply option for income generation and socio-economic activities.

## 2.2 Intervention logic of Project

The overall objective of the project is to avoid greenhouse gas emissions by promoting renewable energy technologies for mini-grid rural electrification for productive uses in Chad.

The project is expected to remove the institutional, technical, knowledge and awareness-related barriers to the promotion of a market approach for the development of mini-grid connected renewable energy systems to meet the growing need for access to electricity in rural areas, which is currently met or likely to be met by fossil fuels. This will be done mainly through (i) creating a critical mass of skilled and knowledgeable technicians and public officers; (ii) building awareness

about the appropriate technologies and the best practices; (iii) linking energy services with productive uses, and (iv) putting in place policies encouraging the involvement of the private sector and providing access to innovative and smart financial mechanisms.

The project aims to establish around five (5) pilot sites (mainly PV) in off-grid isolated communities on a market-oriented public-private partnership approach. Pilot sites will be selected on the basis of their potential to use the generated energy for productive uses that will generate income.

The project consists of three components:

- ***Component 1. Institutional, policy and financial mechanisms***: this project component aims at strengthening the policies and regulatory mechanism to effectively promote and support market based development through measures encouraging public-private sector partnership and smart financial mechanisms. This will be done through raising the awareness and building the capacity of the stakeholders and formulating an effective, market-oriented policy framework to stimulate investments in renewable energy.
- ***Component 2. Identification of a portfolio of solar PV sites and preparation of feasibility studies***: this project component will improve existing information and data on potential PV sites by preparing prefeasibility studies on a number of sites indicating parameters related to their generation potentials, socio-economic profiles of beneficiaries and estimated costs. This will facilitate replication and enable, for the decision makers, the prioritization of investment, and will provide the private sector developers and investors with a tool to make informed selection and decide on the needed inputs to develop a given site into a sustainable clear energy enterprise.
- ***Component 3. Technology demonstration and creation of awareness and technical capacities***: this project component aims to demonstrate the technical and economic feasibility of the photovoltaic based mini grids and to use the process for on-the-job training and the creation of technical capacities. Besides providing access to clean energy for productive use, the established photovoltaic based mini grids will raise the awareness of private sector investors, financing institutions, developers and donors on the un-tapped potential of renewable energy and GHG emission reductions.

## 2.3 Project summary

The project is implemented by UNIDO and benefits from a grant of USD 1,758,182 from the GEF for technical assistance and equipment. The combination of the GEF grant, in-kind and cash contributions from UNIDO and the Chad Government make up the project's resources. The project was approved by the GEF on 11th May 2012 and began implementation in June 2012[2]. The overall project identification data, budget and timelines are provided in the following table.

**Table 1: Project general information**

| | |
|---|---|
| **Project Title** | Promoting renewable energy based mini-grids for rural electrification and productive uses |
| **GEF ID Number** | 3959 |
| **UNIDO ID (SAP Number)** | 100184 |
| **Region** | Africa (West) |
| **Country(ies)** | Chad |
| **GEF Focal Area and Operational Program:** | Climate Change |
| **Co-Implementing Agency(ies)** | n/a |
| **GEF Agencies (Implementing** | UNIDO |

[2] The Request for CEO Endorsement can be found here:

| | |
|---|---|
| **Agency)** | |
| **Project Executing Partners** | Ministry of Energy and Petrol |
| **Project Size (FSP, MSP, EA)** | FSP |
| **Project CEO Endorsement/Approval Date** | 11 May 2012 |
| **Project Implementation Start Date (PAD Issuance Date)** | 5 June 2012 |
| **Original Expected Implementation End Date (indicated in CEO Endorsement/Approval document)** | 1 November 2014 |
| **Revised Expected Implementation End Date (if any)** | 31 October 2015 |
| **Project Duration (Months)** | 40 months |
| **GEF Grant (USD)** | 1,758,182 USD |
| **GEF PPG (USD) (if any)** | 160,000 USD |
| **Co-financing (USD) at CEO Endorsement** | 1,801,364 USD |
| **Total Project Cost (USD) (GEF Grant + Co-financing at CEO Endorsement)** | 3,559,546 USD |
| **Agency Fee (USD)** | 175,818 |

## 2.4 The Project's impact and targets

The end of project targets included at the project design were:

- Total direct CO2eq emission reductions as a result of the project – target 3900 tonnes
- Total indirect CO2eq emission reductions as a result of the project – target 19,500 to 24,700 tonnes (over 10 year lifetime, 2014-2024)
- Number of new electricity connections – target 1250 households, institutions and businesses
- Number of people with electricity access – target 6250 people

The expected project outcomes from these project components, as stated in the project documents, are:

- An effective, market-orientated institutional, financial, policy and regulatory framework to stimulate investments in renewable energy;
- A portfolio of RE energy projects prepared for pilot private sector investments during and post the GEF project;
- Reduced GHG emissions and increased access to rural electrification.

## 2.5 Project implementation arrangements

UNIDO as GEF's executing Agency is responsible for implementing the project, the delivery of the planned outputs and achievement of the expected outcomes. UNIDO is executing the project in collaboration with the Ministry of Energy and Petrol of Chad.

UNIDO is responsible for:

- The general management and monitoring of the project;
- Reporting on the project performance to the GEF;
- Procuring the international expertise needed for delivering the planned outputs under the four project components; and
- Managing, supervising and monitoring the work of the international teams and ensuring that the deliverables are technically sound and consistent with the project requirements.

A Project Coordination Unit (PCU) has been established within the Directorate of Renewable Energy in Chad, consisting of a Project Coordinator and the Project Administrative Assistant. The responsibilities of PCU are as follows:

- Coordination of all project activities carried out by the national experts and other partners by having close association with the Ministry of Energy/State Governments;
- Day-to-day management, monitoring and evaluation of project activities as per planned project work; and
- Organization of the various seminars and trainings to be carried out under Project Components 1, 2 and 3.

A Project Steering Committee (PSC) has been established. This committee has been reviewing progress of the project implementation, to facilitate co-ordination among project shareholders and to maintain transparency in ensuring ownership and to provide support for the sustainability of the project. The PSC has a balanced representation from key stakeholders including counterpart ministries, GEF operational focal point, private sector representatives and UNIDO. The committee is chaired by the Director of Renewable Energy of the Ministry of Energy and Petrol and meets once or twice a year.

Figure 1 presents a summary of the project implementation arrangement.

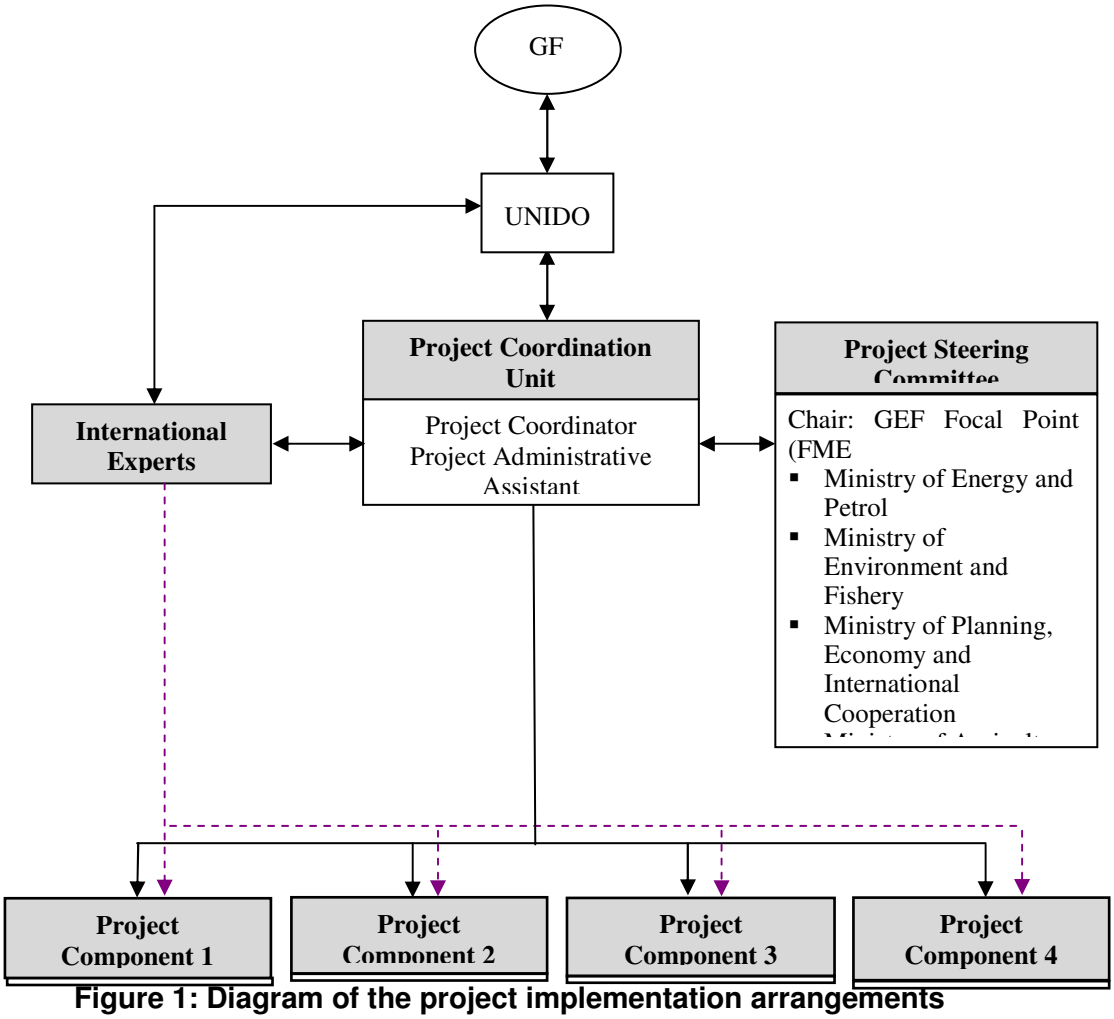


**Figure 1: Diagram of the project implementation arrangements**

## 2.6 Project positioning and counterpart organisations

The Ministry of Energy and Petrol is the main counterpart agency, and the Directorate of Energy, in particular, by virtue of its central role in energy. The Directorate is responsible for setting energy policy including rural energy. In the past two years the Directorate of Energy has established units for energy planning, for electricity and for renewable energy. In addition a national Agency for the Development of Renewable Energy (ADER) has been established. The Renewable Energy unit is responsible for renewable energy policy whilst ADER is responsible for the coordination of all the projects and programmes related to renewable energy. As part of the MTR each of these stakeholders was consulted with.

# 3 Project assessment

## A. Project Design and Relevance

These sections review the link between the original Project design and local circumstances to assess whether the Project addresses the problem and the extent to which it has continued relevance. The Reviewers assessed the problem addressed by the Project, the Project strategy and the Project results framework. A more in-depth analysis of the Project Results Framework, including at the Output and Outcome indicator levels, is included in Annex A.

### *1.A.1 Problem Identification and strategy*

#### Addressing identified challenges

The original project design is still relevant to the country context and addresses key needs and market barriers to renewable energy and rural electrification in Chad.

The RCE sets out the main barriers to establishing mini-grids for rural electrification in Chad; namely a lack of a legal and regulatory framework; lack of information on available renewable energy resources; lack of technical capacities nor appreciation of the technical feasibility and commercial viability of RE and a lack of access to capital. The stakeholders consulted during the review confirmed the continued relevance of these barriers. The following table provides some analysis on the relevance of each of these challenges and their continued relevance.

**Table 2: Review of the continued relevance of barriers**

| Barriers to renewable energy based mini-grids in rural areas | Comment on its relevance based on project experience as learned during the MTR |
|---|---|
| Lack of a legal and regulatory framework | **Very relevant.** There is no clear framework for the development of RE based mini-grids. The current laws lack clarity on roles, processes and allowable business models. To ensure that further RE mini-grids can be developed it is imperative that there is additional certainty for both private sector and community to invest or run such projects. |
| Lack of information on available renewable energy resources | **Relevant** but not actually mentioned by any of the consultees as being a barrier to taking forward mini-grids or RE. There are significant solar resources throughout the country. Further data would be required to develop wind or biomass projects however the project design does not address this barrier. |
| Lack of access to capital and the need to engage | **Highly relevant** There is a lack of both governmental financial support and commercial finance for RE. This was highlighted by all |

| Barriers to renewable energy based mini-grids in rural areas | Comment on its relevance based on project experience as learned during the MTR |
|---|---|
| public and private sector | stakeholders. Government needs to see results (evidence) to allocate budget to RE.<br>There has been very little renewable energy development in the country and therefore it is still seen as a 'novel' technology and therefore is perceived to be risky. Businesses continue to be risk averse so significant engagement will be required for the private sector to invest. |
| Lack of technical capacities and appreciation of technical feasibility and commercial viability of renewable energy | **Highly relevant.** This is a continued barrier recognized by all stakeholders – both government and non-government. The Government has set up a RE agency (ADER) and a RE department but as yet these organisation have no or little capacity to take forward RE. Outside of government there is little knowledge of RE and no skills to design or implement an RE project. Until this project there have been no projects and so it has been difficult to demonstrate technical feasibility and commercial viability. |

A few additional challenges were identified by the consultees during the mid-term review as detailed below:

- General lack of public awareness of RE and a lack of data, more generally, to be able to plan for electrification (eg. electricity needs and population);
- There are no demonstration projects in the country, which is related to the lack of awareness; and
- Another barrier mentioned by a number of consultees is the presence of an oil lobby in the country which looks to promote fossil fuel generation in place of RE.

The status of RE or mini-grids in Chad has not changed significantly since the Project's inception. Although there have been changes in the institutional framework within the Ministry of Petrol and Energy, as detailed earlier, these have not yet had an impact on RE in Chad. Partly this is due to the changes being only very recent and partly due to the significance of the other barriers to RE.

## *1.A.2 Review of Project objective*

The GEF-UNIDO developed the Project "Promoting renewable energy based mini-grids for rural electrification and productive uses", with the objective of[3]:

> *"To promote selected renewable energy technologies for mini-grid connected rural electrification in Chad and thereby avoid GHG emission"*

Based upon interviews with various stakeholders and review of Project documentation, the Reviewers consider that this objective remains highly relevant to addressing the issues of renewable energy and rural electrification in Chad. That said, it is clear that one of the objectives of the project was also to increase productive activities from the electricity access but this is not included in the objective statement, although it is in the project title.

The key impact targets, included as part of the Project Results Framework and in the initial monitoring and evaluation (M&E) plan, are:

- Total direct CO2eq emission reductions as a result of the project – target 3900 tonnes
- Total indirect CO2eq emission reductions as a result of the project – target 19,500 to 24,700 tonnes (over 10 year lifetime, 2014-2024)

[3] The Request for CEO Endorsement is available at: http://www.thegef.org/gef/project_detail?projID=3593

Although indicators are provided for numbers of connections no targets were provided in the framework for impact. The following targets are taken from one of the components.

- Number of new electricity connections – target 1250 households, institutions and businesses
- Number of people with electricity access – target 6250 people

The overall objective for the project and the indicators for them are suitable and provide *some* of the picture for the attainment of the objective, although the baseline provided appears to refer to another project. In addition it would be good to understand how much renewable energy was installed (eg kW installed), how much productive activity was enhanced (eg. no. of businesses or no. of new jobs) and to be able to have an idea of how RE is promoted nationally with an indicator referring to the strategic framework.

## *1.A.3 Review of Project Activities, Targets, Assumptions and Risks*

The Project was designed to address the aforementioned barriers through three interlinked components:

- **Component 1 – Institutional, policy and financial mechanisms**. Activities were designed to support the Government to reinforce the existing policy, legal and regulatory framework for RE for mini-grids to effectively promote and support market based development through measures encouraging public-private sector partnership and smart financial mechanisms. The project design included for developing new regulation to attract the private sector to the RE market but no details were provided as to what this might include. At the same time it was foreseen an overall strategic framework for RE would be developed as well as capacity building activities. In the section providing details of the activities fewer particulars are provided. In addition the indicators provided for the work do not reflect these activities. The activities are very relevant to addressing the barriers but there was insufficient detail provided in the project document and the focus was on renewable energy more generally, rather than focussing on mini-grids.
- **Component 2 – Assist project developers with feasibility studies**. Activities were to include identifying project sites for RE projects and to develop a portfolio of viable and bankable projects for PV mini-grids which could follow a PPP approach. The document includes work related to energy resource data and site selection taking into account generation potentials, socio-economic profiles of beneficiaries and estimated costs. The target was to identify 10 sites and to "provide private sector developers and investors with a tool to make informed selection and decide on the needed inputs to develop a given site into a sustainable clear energy enterprise". The concept is relevant for addressing the barriers but in reality five sites had already been selected at the project design stage, in consultation with the government, and the reliance on the private sector being ready to express interest (or invest) was over-estimated.
- **Component 3 – Technology demonstration and creation of awareness and technical capacities**. Activities to include demonstration of the technical and economic feasibility of photovoltaic based mini grids and to use the process for on-the-job training and the creation of technical capacities. As part of the PPG activities feasibility studies were prepared for the five identified sites. These feasibility studies were too simple, were not detailed and were not technically or commercially robust and so therefore they over-sized the five systems and over-estimated the number of connections at each site.

  The idea was that besides providing access to clean energy for productive use, the established photovoltaic based mini grids will raise the awareness of private sector investors, financing institutions, developers and donors on the un-tapped potential of renewable energy and GHG emission reductions. This is highly relevant and appropriate for addressing the barriers.

This project design adequately addressed some, but not all, the stated barriers. The project was formulated based on a logical framework with outcomes and activities for three main project Components, which contribute to the programme objective. The information on RE is not addressed and the lack of access to capital is only partly addressed through the design of a more conducive regulatory environment.

Therefore based on information examined during the MTR process, these components and their outlined activities are *generally* highly relevant for addressing the barriers to renewable energy and rural electrification for productive uses. However the specific activities and baselines relating to all three Components were inadequately detailed at the project design stage.

In the opinion of the Reviewer, UNIDO is well-suited to address these barriers through the combined efforts of its staff and consultant teams.

The GEF "Project Results Framework" in the CEO document should detail the Project's objectives, the objectively verifiable indicators, targets, sources of verification and assumptions for each of the project activities, for the project outcomes and overall project impact. However in this case the project results framework provides only a framework for the project outcomes' indicators; i.e. the framework does not provide verifiable indicators and targets for each of the foreseen project activities or outputs. That said some of the indicators stated refer directly to activities.

Overall there is a lack of consistency between the description of the project and what was included in the results framework at project design and displays a lack of understanding between outputs and outcomes. This lack of clarity makes it difficult to really understand all the expected outputs and outcomes of the project at project design.

***It is recommended that a new Project Results Framework is prepared which reflects the activities and includes SMART indicators for each output and outcome.***

The UNIDO project managers who took over the project in October 2012 realised that the project design lacked consistency and therefore a subsequent clearer work plan was agreed with the project steering committee (PSC) in April 2013 and a monitoring plan was also prepared. These subsequent plans display a better match between activity and indicators yet still the indicators are not all SMART and not all indicators include appropriate targets. Annex E provides commentary on the relevance and appropriateness of the proposed activities and indicators from each of these documents.

## Asssumptions

The key assumptions stated for the above project targets and activities are:

- that there is sustained and solid Government support for the project;
- that poverty reduction and economic growth drives for securing the modern energy input to development grow progressively stronger;
- that there is security and stability in the country;
- various international RE technical cooperation programmes achieve good synergy and leverage of respective complementarities.;
- coherent community acceptance to the participation approach to developing and establishing mini-grids;
- beneficiaries understand the benefits of the new approach; and
- financing from all sources made on a timely basis in line with proposed activities and budget.

At the time these are realistic assumptions. The assumption relating to on-going security and stability in the country has unfortunately, in the last few months, turned out to be optimistic as the security situation has deteriorated due to Boko Haram's activities. Currently work is delayed at two of the demonstration sites due to security concerns.

There were also other important assumptions in the project design, which were never made explicit, that the private sector was sufficiently developed, strong and interested in renewable energy investments. However this is not the case; the Chad private sector is weak and there is

little knowledge of renewable energy in Chad. Another unstated assumption relates to the ease of operating in Chad. It should be noted that Chad is at 185 of 189 on the World Bank's Ease of Doing Business index[4]. These two (implicit) assumptions meant that the project design seriously under-estimated the challenges in working in Chad and with engaging with the private sector.

The other key assumptions, relating to Component 3, are based on the reliance on the feasibility studies carried out at project design. Using the approach outlined in the RCE, the number and size of mini-grids is proportionally linked to the other impacts. Thus, the question of whether the avoided GHG emissions is possible and number of connections are realistic is more about the number and scale of the mini-grids being possible. Because these studies were not sufficient robust the size of the systems, energy generated and the number of connections are all overly ambitious; the targets for kW and kWh (in the text not in the results framework) and thus the targets for GHG emissions avoided are therefore not likely to be met within the project. This is a fault of the Project's initial design.

### Risks

Six significant risks were identified in the RCE document that might prevent these project objectives from being achieved. Table 21 includes a table showing the risks identified during the project design phase and comments on the appropriateness of these risks. The Reviewers believe that the main risks were well-identified and the overall project risk is fairly low assuming the mitigation measures are followed. However one risk was omitted and the probability of some of the risks was underestimated as follows:

- A further risk was identified relating to the non receipt of the outstanding Government co-finance during the project. This is a significant risk and the money has still not been received. UNIDO has already identified this risk and included it in its reporting to GEF (in PIR).
- The risk of oil prices falling was under estimated. Oil prices have halved in the last six months and this has an effect on the economic benefits of renewable energy. In practical terms this effects whether business customers at the demonstration sites connect to the mini-grid system. If there are fewer larger customers on the systems it reduces the mini-grid revenues thereby affecting the sustainability of the system. It also affects the Government's income and therefore availability of finance and the likelihood of further replication.
- The risk related to technical problems was also under estimated. Although it has been mitigated as much as possible a number of technical faults have occurred which impact the confidence of the users, and consequently the revenues from their payments (and so the sustainability), and the confidence of the government in replicating the approach.

## *1.A.4 Amendments to the project design*

Overall, in the period between design of the Project (2008-2010) and this MTR, the Project has remained very relevant. From a design standpoint, the original high-level design and Project strategy is still generally consistent with the needs of all stakeholders. The overall Project's logic is strong though there have been a number of amendments, mainly due to a lack of clarity and consistency in activities described in the project document.

As noted above, the UNIDO project managers who took over the project in October 2012 reviewed the project design and the results from the inception mission in early 2013. Subsequently they developed a clearer work plan which was agreed with the project steering committee (PSC) in April 2013 and a monitoring plan was also prepared. This work plan included designs for revised more realistic demonstration sites with fewer kW to be installed and fewer connections. However these revisions were never recorded in the results framework. Following this an extension of the project

[4] http://www.doingbusiness.org/rankings

was requested in June 2013 with a suggested project closing date of 31 October 2015 (instead of 1 November 2014) with the reasons given as:

- "The delay in receiving co-financing (1,109,211 USD) pledged by the Government of Chad (at that time funds were not expected to arrive to UNIDO until the end of 2013)
- The change of the project manager and consequential delay in the original implementation plan."

Another revised/updated workplan was prepared and approved by the PSC in April 2014 which updated the activities further. The following paragraphs provide an overview of the amendments to date. Additional commentary on the Project design and how it has changed, and its relevance, is included in Annex E.

**Related to the impacts of the Project**, no major amendments have been made. However, the Reviewer highly recommends the following amendments:

- Based on a review of the feasibility reports and discussions with the Project managers, it is the Reviewer's opinion that the impact-level targets relating to GHG emission avoidance and the number of connections will not be achieved.
- If the promised co-finance is received in March 2016 it is recommended to revise the targets to 300 connections and 2235 $tCO_2e$ GHG emissions avoided and to request a contract extension.
- Without the promised co-finance from the Government of Chad it is recommended to develop a contingency results framework with lower targets of 219 connections and 1590 $tCO_2e$ GHG Emissions avoided..

**Related to the Project Outcomes**, no significant amendments have been made although the wording in the PIRs has simplified and clarified the outcomes and indicators. As above the Reviewer highly recommends the following amendments:

- Based on a review of the feasibility reports and discussions with the Project managers, it is the Reviewer's opinion that the outcome-level targets relating to GHG emission avoidance and the number of connections will not be achieved.
- If the promised co-finance is received in March 2016 it is recommended to revise the targets to 300 connections and 2235 $tCO_2e$ GHG emissions avoided and to request a contract extension.
- Without the promised co-finance from the Government of Chad it is recommended to develop a contingency results framework with lower targets of 219 connections, 1590 tCO2e GHG emissions avoided and 3 trainings.

**Component 1: Institutional, policy and financial mechanisms**. Based on discussions with the project managers it is clear that the project team is supporting RE policy as proposed at project design. However the specific support offered has changed. The amendments to this activity have been to do with a clarification of the outputs and work related to the strategic framework and now directly meet the needs of the Government. Activities relating to capacity building have been moved to Component 2. It is recommended to update the results framework indicators and targets in line with the actual activities.

**Component 2: Assist project developers with feasibility studies.** The amendments to this component relate to the addition of capacity building activities, the involvement of the private sector and a reduction in the number of viable PV mini-grid sites identified. The new workplan includes for:

- the establishment of a unit on renewable energy within the Energy Directorate;
- organisation of training on RE software and planning, design and monitoring of PV and mini-grid projects;

- activities related to promoting investment in RE and mini-grids including mapping of stakeholders and a meeting between public and private sector actors; and
- five feasibility studies.

It is unclear why the institutional and capacity building and private sector activities were moved to Component 2 when they fit better within Component 1. Ideally these activities would have remained in Component 1 but at this late stage it does not make sense to move them again.

If the co-finance is not received it is unlikely that all these activities and outputs will be delivered. It is recommended to reflect these activities in an updated Project Results Framework along with SMART indicators and realistic targets. As above a results framework for the receipt of co-finance and a contingency framework without are required. The contingency will include fewer training sessions and will omit the private sector activities.

**Component 3: Technology demonstration and creation of awareness and technical capacities.** The main changes to Component 3 have been with respect to the phasing of the work and a change in the size of the projects being delivered. The official targets need to be revised downwards. Following the inception mission of the main contractor, TTA, it became clear that the feasibility studies in the design document were not accurate or reflective of the situation on the ground. The new feasibility reports provided new figures for the likely kW installed and number of connections. At the same time provisions had to be made for phasing of the project to allow for a delay in the receipt of the Government co-finance.

Further detail has also been added to the workplan regarding the delivery of business models and forming of Local Associations. The new workplan provides more detail on the project deliverables but the targets for the actual outputs have not been added.

It is recommended to update the indicators and targets in line with the reality and to reflect all the activities included in the April 2014 workplan. As with the outcomes it is recommended that:

- If the promised co-finance is received in March 2016 it is recommended to revise the targets to 300 connections and 2235 $tCO_2e$ GHG emissions avoided and to request a contract extension.
- Without the promised co-finance from the Government of Chad it is recommended to develop a contingency results framework with lower targets of 219 connections, 1590 tCO2e GHG emissions avoided and 3 trainings.

***It is recommended that a new Project Results Framework is prepared which reflects the amended activities and targets and includes SMART indicators for each output and outcome.*** A draft has been proposed by the Reviewer and is included in Annex G. The actual targets should be completed by the Implementing Agency for the two cases – with and without the receipt of co-finance.

***It is recommended to set a final deadline as 27th March 2015 for funds to come through from the Government, without jeopardizing the achievement of the revised objectives.*** However the Project would need to be extended by at least six months to March 2016. For the use of GEF funds beyond October 2015, this will require an official request to the GEF Secretariat by UNIDO.

If the cofinancing does not come through, the contingency results framework recommended above will have to followed on the basis of the currently available resources.

## *1.A.5 Comments on the designed implementation arrangements*

The designed implementation arrangements were appropriate for such a project, in particular:

- A key positive element of the project design has been the allowance for adaptive management. This has allowed the activities and approach to be changed in line with better understanding of the local circumstances and resources, for example Component 3 was changed to include a phased approach to take into account the delay in receipt of the co-finance.

- The project design appropriately allowed for coordination by UNIDO through their local Chad office and headquarters in Vienna.
- The project design appropriately included for a Project Steering Committee.

However the reviewers believe that the schedule for the project was ambitious since it did not allow for sufficient time for start-up (mobilization) and did not allow for additional time required in to do business in Chad, for example the time required to negotiate, to get equipment through customs and stoppages for the rainy season.

Further details on the management and co-ordination during implementation are provided in Section H.

### *1.A.6 Relevance*

Overall, in the period between design of the Project (2008-2010) and this MTR (2015), the Project has remained very relevant. This has been assessed through the review of documentation and interviews with the project stakeholders.

#### Relevant to policies (at conception and continuing) and country ownership

The project outputs and activities continue to be clearly in-line with the Government policy and priorities. The Government has a target of 75% energy access by 2030, starting from a position of about 14% energy access. The National plan of rural electrification aims at finding alternative resources to increase the access to electricity of the populations in peri-urban and rural areas. The Energy Strategic Plan recommends that solar and wind power are developed. The Minister of Energy confirmed this by stating that he believes that off-grid mini-grids and renewable are the way ahead for Chad since the grid will not extend to the rural areas quickly enough. In addition the PRSP also includes for increasing the access to household electricity and to reduce green house gas emissions.

In parallel in 2014 the Ministry of Environment of Chad made a request to the Clean Energy Solutions Centre to look at the potential for the use of renewable energy and the appropriate business models to develop mini-girds. The report was delivered in August 2014.

The project is consistent with the GEF Climate Change focal area, and more specifically with Strategic Programme/ SP 3 - Promoting market approaches for Renewable Energy: this project aims to "promote on-grid renewable energy" and contribute positively to the market transformation process by the implementation of viable and sustainable RE pilot projects, which will enable the Government to further establish the appropriate policy and regulatory framework and contribute to climate change mitigation through replication of such projects.

The project is also in line with UNIDO's strategies and work in Africa. This project is part of GEF Programmatic Approach to Access to Energy in West Africa, approved by GEF Council in November 2008.

#### Relevance to stakeholders

The non-Government stakeholders consulted all agreed with the barrier analysis and the relevance of the project activities in meeting these barriers. The baseline knowledge of renewable energy and mini-grids is low and so any activities that build upon this were welcome. In particular the training activities and demonstration projects were valued. The Government and consultants recognised the importance of the need for clarity in the legal framework with regard to the private sector and communities being involved in the management of off-grid systems.

#### Stakeholder involvement in design

Government stakeholders were actively involved in the project design. In particular the pilot villages were selected by MPE and Ministry of Environment with the aim to cover different representative village types – desert zone, fragile ecosystem and agro-pastoral. It is not clear to

what extent the government was included in the design of Component 1 and 2. The communities at the pilot sites were also consulted during the preparation of the PPG feasibility studies.

### Linkages to other initiatives

Since the formation of ADER in 2013, the agency has had the responsibility for the co-ordination and management of projects in RE. At the design stage, prior to ADER, there was consultation with a number of donors, in particular the European Union which had assisted the Government to formulate a draft energy strategy. The project design built upon this draft Energy Strategy and the original aim had been to work with the EU but rural energy in Chad, per se, is not one of the EU's priorities.

Other initiatives include those of UNDP; UNDP has a large climate change project which includes an RE component with an objective to support Chad to develop energy policies. So far they have carried out a consultation exercise for an action plan for RE and EE. The action plan is currently waiting for validation and this UNIDO project will link with this.

There are no other similar initiatives in Chad. Some work has been done with solar water pumping but otherwise there is little work and the other agencies are not actively developing physical projects with the exception of an UNDP project distributing solar cookstoves for 3000 beneficiaries.

## B. Relevance (included above)

## C. Effectiveness

The section focuses on the Project's effectiveness to date – that is, the extent to which the Project has achieved its mid-point achievements in terms of stated outputs, short- to medium-term outcomes, and progress toward longer-term impact including global environmental benefits and replication effects. This is used as an indication of the likelihood that the Project will meet its targets, achieve the overall results by the end of the Project and global environment objectives (see Table 5 and Table 6 for a summary of progress towards meeting targets). Effectiveness also incorporates stakeholder inclusiveness and the likely situation in the absence of the Project. Other elements that contribute to the effectiveness of programmes, including the implementation approach and the Project's risk management strategy to date, are included in Section H on project co-ordination and management.

### *1.C.1 Attainment of project objectives and results*

**Table 3: Ratings for attainment of project objectives and results**

| | Rating | Reviewers comments |
|---|---|---|
| **Overall Rating** | **Satisfactory** | |
| Effectiveness | Satisfactory | At the "mid-term" the project is on the right track and has made progress towards outputs and outcomes but is significantly behind schedule. There is a significant risk that the project will not meet its overall development objectives due to a lack of co-finance. |
| Relevance | Highly Satisfactory | The project is still highly relevant to the country context and addresses real needs. No shortcomings |
| Efficiency | Satisfactory | Appropriate balance between impact and resources has been achieved although behind schedule. |

Overall, the Project is on the right track and has made noticeable progress towards expected outputs and outcomes, but it is significantly behind the original schedule.

Although considerably slower than planned, the project is on track to achieve its targets in Component 1 - related to an effective, market oriented policy and regulatory framework to stimulate investment in RE; assuming that the current on-going work delivers satisfactorily. The schedule at design was to have completed the key parts of the work by Month 8 i.e. prior to the mid-point.

Much of the work for Component 2 has already been achieved (five feasibility studies) and work on institutional capacity building has been initiated, however some of the other activities are behind schedule and completion of some is in doubt. Although slower than anticipated good progress is now being made on Component 3 but the original targets will not be achieved.

The most significant constraint to achieving all the project results and outcomes is the budgetary situation with the absence of the remaining co-financing from the government. Numerous and continuous attempts have been made by the UNIDO management to advocate for a transfer of the remaining financial contribution however it is has still not been received by February 2015.

Other contributing factors to the current situation stem from the Project design being overly optimistic about the start-up pace of projects and the under estimation of the challenge in working in the country. In particular:

- It took time to put staff in place, and to contract consultants, to start implementing the project.
- There were changes in the project management personnel which delayed the start of some activities.
- Changes were made to the implementation of the pilot projects to account for possible delays in receipt of the co-finance. This further delayed the implementation of the pilots.
- The work identified in Component 1 at design was insufficiently detailed to take forward immediately. At the same time there was re-structuring of the Ministry of Energy and Petrol as well as staff changes at UNIDO. All together these issues delayed the contracting of legal consultants to take the work forward.

Further detail of what has been achieved in each of the components is given below and in Table 6.

### *1.C.2 Component 1: Institutional, financial, policy and regulatory framework*

Work under Component 1 has been flexible in line with MPE's requirements and is likely to achieve its objectives by the end of the project. This project component aims at strengthening the policies and regulatory mechanisms to effectively promote and support market based development through measures to encourage renewable energy based mini-grids and public-private sector partnerships. One of the key and primary barriers for this is the lack of a legal basis for their development in Chad.

A local legal consultancy team and an international consultant have been contracted to carry out this work but no outputs have been delivered yet so it is not possible to evaluate the work or its impact. Research and initial consultation has been carried out and it is realistic that the outputs and outcomes will be achieved only in the final months of the project.

The process to contract the consultants started in April 2013 with drafting Terms of Reference (ToR). Significant consultation was carried out with MPE on the content of the ToR to ensure that the outputs were in line with Government requirements. Finally contracts with both the local and international consultants were signed in September 2014. Outputs were expected in Q1 2015 but it is more likely to be in Q2 2015 to allow time for significant consultation and three national validation workshops.

### 1.C.3 Component 2: Assist private developers with feasibility studies

Progress has been made towards meeting the output-level targets to be achieved for Component 2. The main achievements in Component 2 have been the preparation of detailed feasibility studies for five sites and the start of the renewable energy capacity building. The feasibility studies mean that one of the targets has already been achieved.

A contract was signed with TTA in December 2012 to prepare the feasibility studies and then to carry out the follow-on implementation. Five project sites were identified in consultation with the Government, and data collection, socio-economic surveys and technical feasibility studies were all carried out by TTA by March 2013, in line with the schedule. At the same time they consulted extensively with the local communities to help prioritise connections since it was clear that the designs would be smaller than envisaged in the project design, due to budget constraints. The results of the feasibility studies were presented to both UNIDO and at the first Project Steering Committee meeting.

ECREEE was contracted to deliver training on the renewable energy software, HOMER, to stakeholders in Chad. ECREEE developed training material, adapted from its training developed for trainers in ECOWAS, and delivered the training to 35 public and private stakeholders in N'Djamena in December 2014. A web based announcement was made for the training and participants were also selected by the UNIDO PCU and TTA. Training material and the software was distributed to all the participants and ECREEE staff have continued to provide support to the trainees post training.

This is the first of a number of training sessions foreseen but further training sessions have not been contracted yet. The full 8 training sessions are only likely to be completed if the co-finance is received. If not then a contingency for fewer training sessions must be planned for and the contracting should start almost immediately to ensure it is delivered within the project's timeframe.

A renewable energy unit has been established within the MPE and staff from the unit received HOMER training. It is foreseen that the role of planning for RE will be carried out by ADER which also received training in HOMER.

The Project has had very limited success related to the activities involving private sector actors. To date the only real involvement, other than training, has been that a private sector organisation is sub-contracted to carry out the construction and maintenance of the demonstration projects. It is intended that there will be a meeting between public and private sector actors to discuss RE investment as well as the identification and mapping of the current status of private sector investments and key stakeholders. However no work is currently planned on this and is only likely to go ahead if co-finance is received.

### 1.C.4 Component 3: Technology demonstration and creation of awareness and technical capacities

Good progress has been made towards meeting the output-level targets for Component 3.

A contract amendment was signed with TTA in July 2013 which split the Component 3 work into two phases to take into account the delay in receipt of the Government co-finance. It was agreed with the PSC that Phase 1 would include mini-grids at Douguia, Mombou and Guelendeng. TTA visited each of these sites again to finalise the design and take into account any changes since the feasibility studies. At the same time they consulted extensively with the local communities. The final designs proposed are shown in Table 4 below.

**Table 4: Proposed mini-grids in Phase 1 (following final design in December 2013)**

| Parameter | Douguia | Mombou | Guelendeng |
|---|---|---|---|
| Generation (kWp) | 40 | 39.6 | 32.4 |
| Inverters (W) | 36 | 36 | 36 |
| Distribution line | 2.7 km | 9.7 km | 5.9 km |
| Final users | 54 | 138 | 27 |

The proposed design was similar to that proposed in the feasibility studies with the exception that TTA now proposed underground distribution lines, rather than overground, as a better technical solution for Chad. The choice of underground distribution lines was accepted by the Mombou community and has the additional benefit of engaging the beneficiaries in the project. The proposed design including shelter under the PV panel canopy was also appreciated as innovative; rather than being ground mounted.

The design of the equipment was approved by the technical team (Project Manager) at UNIDO. The equipment was ordered and then further checks of the equipment and design were made prior to the shipment of the equipment from Spain. This was checked during a mission carried out by UNIDO Procurement and the Substantive Office. TTA built a mock-up of the system in Barcelona to ensure that the system works and so that all the equipment and parts could be pre-labelled to speed up the process on site.

The equipment was shipped to N'Djamena via Cameroon. From Barcelona to N'Djamana including clearance at customs took three months. UNDP helped with the customs clearance. This delayed the project slightly. Land was identified and provided by the local government in each case following discussions and negotiations carried out by the local project co-ordinator.

At the time of the MTR two PV-hybrid power plants have been constructed with a total capacity of 80.6 kW at Mombou and Douguia, and civil works have been carried out at Guelendeng:

- In Mombou the PV power plant equipment (39.6 kWp), distribution lines and household connections with electricity meters/dispensers to 134 connections have been installed, commissioned and have been operating since June 2014. Initially 129 connections were made but since June one household has disconnected and five more have connected. Three of the connections are for water pumps in the market gardens but only two are currently working. The third is a 3-phase pump and needs to be replaced with a 1-phase pump to be connected to the system. 11 street lights have been installed which is less than the 18 planned. The village population is about 800 people with potential connections of about 150. Local residents were paid to help dig the trenches for the underground cabling and helped with the internal wiring in the households.
- In Douguia the PV power plant (41 kWp) and civil works have been completed and the system is working but work on the distribution lines is only starting now. All equipment has been delivered to site. Approximately 54 users have been identified and street lighting will be included. The population of Douguia is about 1500 with a total number of potential connections of 200.
- At Guelendeng the civil works have been completed with the construction of the two buildings and perimeter fence. All equipment has been delivered to site and work was starting on the power station at the time of the MTR visit.

In addition to the technical mini-grids, significant work has been done on the design of appropriate business models for the mini-grids and the establishment of Local Associations and management teams as well as the associated tariff setting and on-the-job training. The management team (made up of three) is contracted to the Local Association. Regular maintenance is carried out by the local technician, payments are collected by the manager and the gardien looks after security.

An N'Djamena company has been contracted by TTA as their local representative and 'level 2' maintenance contractor. This company, IDEB, was involved in the installation of the PV systems and is now responsible for regular visits to the sites to check maintenance, update the payments on the payment system (graveur) and collect the money. The revenue is used to pay the management team, pay social security payments and to fund future equipment replacements. The money is currently kept in an account in TTA's name in N'Djamena. Progress at each site is as follows:

- At Mombou a local association and business model has been established and the local teams have been trained. The system has been operating since June 2014.
- At Douguia a local association and management team are in place and tariffs have been agreed.

- At Guelendeng work is currently being carried out to identify the members of the Local Association and to recruit the local management team.

Overall progress has been slower than expected partly due to the delays in transportation, due to discussion over the design and then having to wait for the end of the rainy season.

The Project has started delivering on its outcome and impact targets related to the pilot projects, specifically avoiding GHG emissions 10 $tCO_{2e}$ and energy access (134 connections; approximately 700 people connected and three productive activities).

## *1.C.5 Likelihood of meeting objectives and global environmental objectives*

At the 'mid-point' of the project there has been noticeable progress however there is a significant risk that the project will not achieve its overall development objectives within the project timeframe. Based on the available finance and progress to date the number of mini-grids, number of connections and GHG emissions avoided is likely to be less than envisaged. At this point only 134 connections have been made and 10 $tCO_2$ have been avoided.

The objectives relating to Component 1 are likely to be met within the project timeframe with recommendations for a revised regulatory framework and Electricity Code being validated by Government. Although not foreseen in the project design it is worth noting that it is not likely that any recommendations or changes would be implemented within the project timeframe.

The promised Government co-finance has not been received which has had a significant effect on the progress of the project, particularly Components 2 & 3.

- If the co-finance is not received it will not be possible to meet all the project objectives.
- If the co-finance is received in the next month it will only be possible to meet project objectives if they are revised downwards, as recommended in the previous section, and would only be achievable with additional time. It is possible that *revised* project objectives could be met with a project extension of 6 months. In particular:

**Component 2**

- Capacity in government, local communities and private sector will be developed. Progress has been slower than foreseen and has only recently begun. However 35 public and private sector actors already have increased capacity. With no further co-finance the capacity building will be significantly limited. If the co-finance is received in the next month project objectives could be met with an extension of 6 months.
- Training could trigger further investment in renewables or mini-grids but there is no mechanism for measuring any follow-on benefits from the training. Already one of the energy professionals who received training claims they have identified suitable sites for customers for RE. It is recommended to introduce a monitoring mechanism, or feedback, for the energy professional trainees to report every 6 months on the RE projects they have identified as a direct result of the training. This could then be included as an additional impact of the project.
- Activities related to increasing private sector interest are only likely to be carried out if the co-finance materialises and to allow time for them an extension of 6 months would be required.

**Component 3**

- 219 connections and 3 mini-grids will be completed without the co-finance. No further RE investment or connections will be possible without further funding.
- If the co-finance is received in the next month then it would be possible to implement 2 new mini-grids and to enhance the mini-grid at Guelendeng and to provide a further yy connections.
- In addition likely GHG emissions avoided will reach 1590 tCO2e rather than 2235 $tCO_2e$ without co-finance. These additional objectives can only be met with a project extension of 6 months.

A deadline needs to be set for the Chad government funds to be received. As advised above if the funds arrive before the end of March then it is possible that the project could meet its revised objectives with a 6 month extension. If the co-finance does not arrive by that time it is advised to complete the project in October 2015 with the available resources and so not meet the project objectives.

Based on the MTR process, Table 5 indicates the main Project impact indicators, their targets for the end of the Project, the results achieved to date, and the results expected by the end of the Project.

Table 6 indicates the Output-level targets to be achieved by the end of the Project due to Project activities in the various components, the Results achieved to date, and the Reviewer's assessment of the likelihood of meeting targets by the end of the Project. Note that in many cases indicators and/or targets were not provided against activities in the project design. Therefore the following table includes potential indicators proposed by the Reviewer in the proposed revised project results framework, based on the activities described in the workplan, monitoring plan and project framework. **It is recommended to allocate realistic targets to each indicator in a revised Project Results Framework.**

**Table 5: Main project impact and outcome-level indicators, their results achieved to date, and the likelihood of meeting the targets by the end of the Project**

| Project Strategy | Objectively Verifiable Indicators | Target | Progress to date | Likelihood of meeting the targets by the end of the Project |
|---|---|---|---|---|
| **Impact** | | | | |
| *GEF Strategic Priorities:* Strategic Program 2: Promoting EE in the industrial sector | Incremental direct and indirect CO2 emission reductions | Direct: 3900 tonnes CO2eq Indirect: 19,500-24,700 (over 10 year lifetimes) | Total electricity generated to date is estimated at 11,200 kWh estimated to have avoided 10 tCO2eq. | **Possible, if co-finance materialises** – The expected avoided GHG is possible if all five pilot projects are completed. Based on the feasibility studies total annual generation is expected to be 251 MWh so avoiding 2230 $tCO_2$ e. |
| | No. of electricity connections on selected sites | Approx. 250 connections per site (total 1250 hh and small businesses) | 134 connections have been made to date at one of the three pilot sites in phase 1. | **Unlikely** – Following the preparation of the detailed feasibility studies the number of connections per site varies between 27 and 138. The likely total number will be 300 even if all five pilot sites are developed once co-finance materialises. Without cofinance 219 connections. |
| | No. of selected local businesses and household with access to electricity on selected sites | No target provided in results framework | 3 water pumps for market gardening are connected to the Mombou grid. | No target provided. Recommended to establish a realistic target. |
| **Outcomes** | | | | |
| An effective, market orientated policy and regulatory framework to stimulate investments in RE | Availability of strategic framework for RE | Strategic framework for RE validated by government. | On-going. A local legal firm and an international consultant have been contracted to carry out the work. | **Likely –** by the end of the project, rather than at mid-term. |
| A portfolio of RE projects prepared for private sector investments during and post the GEF | Identification of number of project sites for installation of economically viable RE systems and prioritised for productive use | 4-5 project sites identified and detailed feasibility studies prepared. | Five detailed feasibility studies have been prepared for Douguia, Mombou, Guelendeng, Mailao and Dourbali. | **Already achieved**. |
| Reduced GHG emissions and increased access to | Incremental direct and indirect CO2 emission reductions | Direct: 3900 tonnes CO2eq Indirect: 19,500-24,700 (over 10 year lifetimes | 10 t CO2eq avoided to date from generation at Mombou since June 2014 | **Possible, if co-finance materialises** – The level of expected avoided GHG is notpossible if all five pilot projects are |

| Project Strategy | Objectively Verifiable Indicators | Target | Progress to date | Likelihood of meeting the targets by the end of the Project |
|---|---|---|---|---|
| rural electrification | | | | completed. Based on the feasibility studies total annual generation is expected to be 251 MWh so avoiding 2235 $tCO_2e$.. |
| | Number of connections per site and number of households and small local businesses with access to electricity | Approx.. 250 per site with a total of 1250. | 134 connections have been made to date at one of the three pilot sites in phase 1.<br>3 water pumps for market gardening are connected to the Mombou grid | **Unlikely** – Following the preparation of the detailed feasibility studies the number of connections per site varies between 59 and 138. The likely total number will be 300 even if all five pilot sites are developed once co-finance materialises.219 without co-finance |
| | Trainings conducted for the local authority officers and interested private sector service providers | 8 trainings | One training has been carried out | **Likely if cofinance materialises and extension –** if the co-finance does not arrive then the number of trainings will be reduced to 3. |

**Table 6: Project output-level indicators, progress to date and the likelihood of meeting targets (based on a revised project results framework developed for this report reflecting activities being undertaken)**

| End of project targets | Progress to date | Likelihood or reaching targets by end of project |
|---|---|---|
| **Project Component 1 – Institutional, financial, policy and regulatory framework** | | |
| Review of relevant regulatory and strategic RE frameworks published | On-going. A Chadian legal firm and an international consultant have been contracted to carry out this work. Their Terms of Reference include a review of relevant regulatory and legal frameworks in other countries and the development of a policy document on the promotion of RE based mini-grids and proposals for a change to the Electricity Code. Thee validation workshops are foreseen. The work is to be completed in Q1 2015. | **Likely** – Work has already started although delivery may be in Q2 2015. , |
| Clear strategic framework for RE in Chad | | |
| Recommendations made on Electricity Code | | |
| 3 validation meetings<br>Signed adoption of strategic framework | | |
| **Project Component 2 – Assist private developers with feasibility studies** | | |

| | | |
|---|---|---|
| 5 detailed feasibility studies completed | Five detailed feasibility studies have been completed for Douguia, Mombou, Guelendeng, Mailao and Dourbali. | **Already achieved.** |
| 8 training sessions<br>(y on planning, z on software) | One session to date. HOMER training was carried out in December 2014 for 35 staff. Participants were from both the public sector and private sector. | **Likely if co-finance materialises** – Two further training sessions are possible with existing budget but all 8 is only possible if co-finance is received. |
| X trained public sector employees | | **Realistic targets required for each of these indicators (with and without co-finance).** |
| X private sector organisations trained | | |
| % female trainees | One of the 35 trainees was female (<3%). | |
| X public sector actors capable of designing, promoting and managing RE projects | | |
| One public-private partnership is operational | The management model for the mini-grids is that a private operator will take over the operation, maintenance and management of each of the mini-grids after the first year. This organisation will work with the Local Association. | **Possible** - It is too early to tell if there is interest from the private sector in operating the mini-grids and the Government is supportive of a community owned approach. Work is required to identify possible partners. |
| Department established made up of x experts | Renewable energy department has been established | **Achieved** |
| X of meetings between private and public sector actors to discuss RE investment | No meetings have been arranged | **Possible with co-finance** – This part of the project will only start once the remaining co-finance has been received. |
| Report on barriers to development of RE projects are identified and recommendations developed for overcoming them | There is a reference to barriers to investment in the ToR for the legal consultants but they are not required to produce a full report on it. | **Possible** – Some information should be provided in the reports delivered by the sub-contractor for Component 1. |

| | | |
|---|---|---|
| Map of private sector investments and key stakeholders interested in RE | No mapping undertaken. | **Possible with co-finance** – This part of the project will only start once the remaining co-finance has been received. |
| **Project Component 3 – Technology demonstration and creation of awareness and technical capacity development** | | |
| 5 PV mini-grids installed at:<br>Douguia<br>Mombou<br>Guelendeng (2 parts)<br>Dourbali<br>Mailao | On-going.<br>PV mini-grid installed, commissioned and operating at Mombou since June 2014<br>PV hybrid power plant constructed at Dougia and work on-going on the distribution lines.<br>PV hybrid power plant under construction at Guelendeng.<br>PV hybrid power plants installed at Mombou and Dougia. (figure 1), a Low Voltage (LV), a<br>three phase distribution line and smart electricity dispensers at each subscriber's interface | **Likely with co-finance and extension** – The remaining two sites and part 2 of Guelendeng will be financed with the outstanding co-finance. |
| X households connected<br>Y institutions connected<br>(disaggregated by site)<br>Target of 1250 connections in total. | 134 connections at Mombou including 3 water pumps, the health centre and 130 households. In addition there are 11 public street lights. Service contracts for each connection have been signed, and the tariffs developed, agreed with the local Associations and approved by the project PSC.<br><br>At Dougia 17 street lights and 55 connections are planned | **Unlikely** – Figures provided in the Project document were over-ambitious on the number of possible connections. Feasibility studies include the number of connections per site varies between 59 and 138. The likely total number will be 300 even if all five pilot sites are developed once co-finance materialises. 219 if not. |
| Installed capacity of more than x kW<br>(disaggregated by site) | Total installed capacity is 80.6kWp at two sites.<br>41.01 kWp – Douguia (plus 50kVa genset)<br>39.6 kWp – Mombou (plus 50kVa genset)<br>Equipment has been delivered to Guelendeng and is in the process of being installed. | |
| 3900 CO2 eq emissions avoided<br>(disaggregated by site) | 11,200 kWh generated to date resulting in 10 $tCO_2$ eq. | |
| 5 community managed local associations established and operating | TTA have developed a service model, tariffs, pricing mechanisms, and risk management assessment for the project's rural mini grids. The management model structure is based on a private operator partnering with a village institution. It was presented and approved by the 2nd PSC and is being tested and optimized through a one year concession of the service to TTA (i.e. TTA is the service operator for year 1). This is in accordance with TTA's Contract Amendment 1. TTA has appointed IDEB, the local company involved in the installation, as TTA representative for the | **Likely if co-finance materializes and project extension** – The three sites in Phase 1 will be completed with operating Local associations and management teams by end of Q1 2015. The remaining sites will depend on co-finance. |

| | | |
|---|---|---|
| | two main activities: O&M (2nd level), and financial control and Association supervision.<br><br>Village Associations have been created and registered for the village of Mombou and Douguia in June 2014. Agreements were signed between the associations and TTA.<br><br>The management team has been selected at Dougia and Mombou and at Mombou they are already managing the operating system.<br><br>Recruitment of the association and management team is on-going at Guelendeng. | |
| O&M manuals at each site | Manuals on plant operation and maintenance as well as user's guides have been developed and issued for Mombou. | **Likely** – O&M manuals already issued for one site. |
| As- built documents | As built document issued for Mombou. | **Likely** – As built documents already issued for one site. |
| X trained people at each project site (total of y) | Training held at Dougia and Mombou. Training of multidisciplinary team through on-job training has been done on the issues of construction, commissioning, operation and maintenance & management. This has been done with national professionals and trainees as well as with selected community members. | **Target required** – Although training has been delivered sufficient to do the job, the expectation for further training is still there. |
| X businesses connected (disaggregated by site) | 3 water pumps for market gardening are connected to the Mombou grid (one not working yet).<br>Further businesses are foreseen at Dougia. | **Target required.** |
| **Other** | | |
| 2-4 case studies | The equipment installed at each site includes metering equipment which will allow for detailed monitoring of energy generated and delivered which can be recovered via modem. This is already operating at Mombou. | **Likely** - Need to agree if this is a useful output and how many case studies are needed and to contract their preparation. |
| Dissemination and public awareness | Five project bulletins have been published in December 2013, January 2014, March 2014, June 2014 & December 2014. Each provides details of the current progress of the mini-grid projects with photographic evidence. | **No targets or indicators provided** |

## *1.C.6 Stakeholder inclusiveness and collaboration*

The project teams (UNIDO and their subcontractors) have been inclusive of relevant stakeholders. The MTR team carried out interviews with 15 stakeholder groups in addition to UNIDO, and found that there was consensus that the consultation and collaboration with them had been excellent and inclusive.

The main stakeholder groups and their involvement in the Project, aside from UNIDO, are listed in the following table.

**Table 7: Project Stakeholders**

| Stakeholders | Description / Level of Involvement to date |
|---|---|
| Ministry of Petrol and Energy / Energy Directorate / Renewable Energy Department | MPE is responsible for the development of policy and legislation of energy. There have been recent changes in the Ministry over the last two years. Now under the MPE is the Directorate of Energy under which is the Department of Renewable Energy and a Department for Energy planning. The staff in the RE department are new and it is important that they are consulted by the contractors carrying out the on-going framework work prior to the validation workshops.<br>MPE has been actively involved in the project implementation. MPE assessed the preliminary designs for the pilot projects and approved them (no objection by PSC). They have also been involved in the approval process for the tariffs within each of the villages and in agreeing the legal set up for the business model. In addition they were involved in the selection of the legal experts.<br>The local UNIDO office keeps the MPE upto date on the project. |
| Ministry of Environment | MoE is the GEF focal point and sits on the PSC. However has little engagement beyond that. |
| ADER | ADER is the newly formed renewable energy agency which is responsible for planning, implementation and public awareness for renewable energy. Plans for ADER started in 2012 with ADER formally established in 2013. ADER's first action was to centralise all projects involving RE, including this UNIDO one. They have been following the project closely and are in regular contact with local UNIDO co-ordination office and have been consulted three times by the legal consultants undertaking Component 1. ADER have leased office space to the project office. |
| SNE | National electricity utility. They are not actively involved in the overall project but have been beneficiaries of the training. |
| Local householders and businesses | In each pilot site local householders and businesses have been in contact with the project teams. The consultation started in 2010 with the design of the project, then in 2013 with the feasibility studies followed by the review in early 2014 and now the implementation. In interview representatives were happy with the consultation but it is also clear that during the earlier visits expectations regarding service (eg. number of connections) were set unrealistically high. |
| Local Associations | Two Local Associations have been established at two of the pilot sites and the third one is in the process of being established. Those established (in Mombou and Douguia) were happy with the consultation regarding the project and have been actively involved in the agreement of tariffs, recruitment of team and management. At Mombou they would like to receive further training on their roles and now that the system is operating they feel slightly excluded from the management although it has been clearly described to them. Some issues have been raised by the LA which they would like to see resolved. Both Local Associations would liked to have seen overground distribution lines but have accepted underground ones. |
| Local institutions / municipals | In each of the three pilot sites of Phase 1 the institutions and municipality have been consulted during the project design and now implementation. They have |

| | |
|---|---|
| | provided land for each of the sites. In Guelendeng the Maire is involved in the recruitment of the LA and management team and has been active in resolving tax issues and selecting the customers for Phase 1. |
| Private businesses | The private sector was not actively involved in the design of the project but have been beneficiaries of the training activities. It is important that the on-going work on the regulatory framework and laws includes proper consultation with the private sector. Two companies have been involved in the implementation of the pilot sites. |
| Other donors | Not key stakeholders within this project but they are kept abreast of project developments. |

In the opinion of those interviewed, there do not appear to be key stakeholder groups that the Project has failed to identify.

**Moving forward, consultation could improve with the MPE and with the private sector for the on-going legislative work**. Local banks could also be involved in this consultation to help them understand the sector better as potential future investors.

### *1.C.7 Perception of quality of outputs*

Overall, it appears that the inputs and outputs by UNIDO and their consultants have been of a high quality and have clearly met the beneficiaries' needs. All stakeholders consulted were very happy with the quality of the work to date. In particular, in meeting with UNIDO in April 2014 the Secretary General of MPE expressed satisfaction with progress and Government commitment to speedy project implementation. Component level summaries are provided in the following sections and where any issues have arisen these are detailed.

**Component 1: Policy and regulatory framework support** – It is too early to evaluate Component 1 since there have not been any outputs yet. The Terms of Reference (ToR) for the work developed by UNIDO are very clear and were developed in close collaboration with the Government. Therefore the work being undertaken by the consultants should help to deliver needed recommendations which the Government can then take forward.

**Component 2: Assist project developers with feasibility studies**

**Feasibility studies:** Five detailed feasibility studies were prepared by TTA which were well received by the Government stakeholders at the first PSC meeting although there were a few reservations concerning details of public lighting, of the proposed phasing, of level of energy generation and of energy access coverage. The Secretary General in particular would like to see more electricity generation at the sites but within the available budget this is not possible. These studies revisited the pilot sites identified at project design and reviewed all the key data relating to potential beneficiaries, the technical feasibility and socio-economic situation so that realistic systems were proposed against the available budget which, in most cases, no longer resulted in 100% electricity connections. Prioritisation of connections was carried out with the community. The studies are considered to be of good quality and the socio-economic data added significant value.

**Training and training materials.** Stakeholders were extremely happy with the quality of the training provided to date and found it very valuable. Training materials were developed by ECREEE for HOMER for a 5 day course. The quality of the training material is good and was clearly adapted for the target audience, for example the first sessions were dedicated to the introduction of renewable energy more generally as the background knowledge of the audience was low. The training material is detailed and included several practical sessions and tests which the attendees particularly valued.

Feedback forms were distributed at the end of the course and show that satisfaction was extremely high with the majority of respondents marking the course 4/5 or 5/5 for every category. The only negative comments related to the refreshments.

Table 8 provides an overview of the numbers trained so far within the project and, where possible, the satisfaction rate.

**Component 3: Technology demonstration and creation of awareness and technical capacities**

**Mini-grids:** At the MTR the main achievement which can be evaluated at this stage is the mini-grid at Mombou. It is difficult to evaluate the work at Douguia and Guelendeng at this stage since it has not yet had any impact on anyone. All stakeholders consulted were happy with the completed work at Mombou. In particular the local users were very happy with the system and were pleased to be part of a project that has real results on the ground. They were happy with the lighting and mobile phone charging now available which is better than the previous solutions (kerosene and paying a local charger). However a number of issues were raised regarding the work:

- The PSC raised concerns regarding the construction standards and norms used for the buildings at each site and the location of the toilet. The PSC was unhappy that local standards had not been used (which includes columns). A solution was proposed to structurally strengthen the building which was subsequently agreed and carried out. The positioning of toilet was also the subject of concern which was then resolved.
- There have been a number of failures (cuts) in the underground cable at Mombou. In each case the cut has been located and fixed within three days. These have occurred on all size of cable at Mombou and depending where the cut is located affect a different number of households or businesses. At worse the cut occurred on the main line from the power station so affecting all villagers. TTA have sent the affected cable to the supplier and manufacturer who has checked the batch numbers and believes that the cable sheath has been damaged during installation. The cut is due to oxidation of the cable due to humidity. It is expected that now the rainy season is over any faults which will occur have already occurred. It is unfortunate that these failures undermine the success and quality of the project and have raised further questions on the applicability of the underground cable.
- The Local Association raised concerns regarding the distribution boxes and their ability to withstand the rainy season.
- Other issues raised related to the number of street lights being less than expected, the need for security lighting on the power station boundary, unhappiness with monthly payments if all the energy is not used, unhappiness with only 4 light bulbs and on the higher level tariffs available for water pumps. Part of these is due to misunderstandings, not wanting to pay higher tariffs for more lights and the reduction in the price of oil making the comparison with the mini-grid less favourable.

Overall the local community is happy with the work carried out by TTA and have felt very included in the work. They are happy with UNIDO but despite frequent visits feel that they do not necessarily offer any solutions to some of the issues outlined above.

**It is recommended that communication of expectations at demonstration sites needs to improve with respect to timing, tariffs, pre-payment systems, street lights, connections and distribution lines.**

**Training** has been provided to the installers as well as to the local management team and Local Association at Mombou. This training has been on-the job training. For the installers this was through learning by doing and with the supervision of TTA. Although the installers are clearly able to carry out the works and to perform maintenance on the systems, they do not consider themselves to have been trained. Similarly the local management team have received on-the-job training. However despite carrying out their jobs successfully since June 2014 they do not consider themselves adequately trained. It appears that training has a specific definition (perhaps related to a classroom or workshop), and on-the-job training does not meet this definition. As a result the stakeholders expressed some dissatisfaction and would like further training, regardless of clearly being able to carry out their roles with the training they have received to date.

Therefore at Mombou it is recommended to provide some additional training to the management team on the overall PV system so they have a better understanding of their role within the larger system and also to the Local Association so that each member receives some training related to their role in the association.

It is recommended that in Douguia and Guelendeng the level of training to be provided is clearly described so that expectations are managed in advance.

**Table 8: The selected events and participant satisfaction rates (Component 2 and 3)**

| Event | No. of Participants | Satisfaction rate / comment |
|---|---|---|
| **Component 2** | | |
| Homer training – December 2014 | 35 | Overall satisfaction from feedback forms:<br>• *Trainer made sure that trainees understood – 74% 5/5 & 26% 4/5*<br>• *Did exercises assist training – 78% 5/5 & 13% 4/5*<br>• *Would recommend the training to others - 87% 5/5 & 13% 4/5* |
| **Component 3 - On-the-job training** | | |
| Training of installers | approx. 10 | Do not think they have been trained. |
| Local management team at Mombou | 6 (one for each role plus one other) | Would like more training and think they have not been trained |
| Local Association at Mombou | 6 | Would like training in their specific roles |

## *1.C.8 Longer term impacts and replication effects*

It is too early to judge longer term impacts or replication effects of the project – either at the demonstration sites or within the RE investment environment and supporting planning and legislative frameworks.

However there is already recognition in Government that access to electricity for the rural population will not be solely through grid extension, nor only from fossil fuels. The Government is therefore very interested in the potential of RE mini-grids and specifically this project's business model for potential replication. The results from this project are likely to feed into future energy access planning.

The sustainability of the business model proposed will be partly dependent on an increase in the number of mini-grids to ensure that there is sufficient viability to attract a private sector actor to maintain and operate the systems. Without clear commitment from Government to roll out these systems the long-term sustainability is limited.

At the demonstration sites the availability of electricity is expected to result in a growth of productive activities, a reduction in users' energy costs and in the avoidance of GHG emissions. At the one operating site, in Mombou, there are only three productive activity users (water pumping for market gardens) and reaction to the mini-grid service has been mixed. It is expected that other productive activities will grow in the village but it is likely to take a long time due to a lack of means to develop businesses (eg. knowledge and finance). With the current users (majority are households at not very high density) a different approach with stand-alone technology may have been more cost effective. Therefore **for future projects sites should be selected with clear productive uses of energy identified or in remote areas it would be recommended to combine electricity access with other activities relating to training for productive activities and micro-finance.**

Following commissioning of the system at Douguia and Guelendeng the volume of productive activities is expected to grow in the shorter term since they are towns which already have commercial centres. Where there are clear productive activities a mini-grid can be the most appropriate choice.

## *1.C.9 Outcome in absence of project*

There is a clear perception from the stakeholders consulted during the MTR that the project is already providing added value and a belief that without GEF funding it would not be possible to demonstrate the technology and business models to show policy makers and private business what is possible.

The policy support work is likely to provide added value through bringing international experience to Chad's renewable energy and mini-grid policy. Through the introduction of international best practice the impact can be increased and implementation errors can be minimised.

Training received during the project has already increased the capacity of government officials and the private sector to design and plan for renewable energy projects. Without this project, the knowledge would remain low and ability to plan for projects would be almost non-existent.

Without GEF finance the customers in the pilot villages would continue to use gen-sets and kerosene and the majority would not have access to electricity. There would be no avoided GHG emissions.

# D. Efficiency

This section assesses the GEF Project's efficiency to date, which is understood as the balance between impact and resources. For this, the consultant considered the quality and timeliness of inputs, the work plan and budget.

## *1.D.1 Timeliness of inputs/outputs*

Although activities are behind schedule, stakeholders interviewed did not raise any serious issues regarding the timing of their delivery.

The deliverables from Component 1 were to be submitted within 6 months of the start of the project. However it was decided to first concentrate on the pilot projects before starting on this part of the work. Terms of Reference were prepared and discussed with the counterparties to ensure they reflected the needs. There was then a delay in the appointment of a local legal team and following contract signature (in September 2014) there were further delays in starting the work due to delays in the first payment from UNIDO. The work is now likely to deliver in Q2 of 2015 rather than Q1 as outlined in the contract.

Within Component 2, the contract with TTA was signed in December 2012 following negotiations to ensure that the work would compensate for the lack of detail in the project design. Despite delays at this stage the five feasibility studies were delivered in line with the schedule.

The revised training schedule (of 2014 workplan) planned for training in September 2014. ECREEE delivered HOMER training in December following some delays due to sub-contracting the trainer and the possible clash with another event in November. As yet, other training relating to planning or design (not software) has not been commissioned so, if delivered, will be in 2015; i.e. behind schedule.

The work related to the private sector was to have been completed in September and October 2014 but has not started.

In Component 3 work at Mombou was in line with the original, and 2014, schedule, but work at Douguia and Guelendeng is behind schedule. Both will be finished by March 2015 which will be 9 months and 6 months late respectively. This is partly due to the pace of doing work in Chad, due to time taken to ship goods to Chad (and through customs), due to the rainy season and due to delays in finalizing designs. Due to the expectation of the arrival of electricity there is local support to deliver as soon as possible. This can be attributed to the fact that the first consultation with the communities was at project design in 2010 so it feels like a long time to wait for power.

## *1.D.2 Level of execution of budget*

The GEF contribution of USD 1.8 million (as described in Table 9) is to be leveraged with approximately USD 1.8 million in co-financing allocated divided between UNIDO and the Chad Government.

**Table 9: Total GEF financial contribution to the Project**

| Type of Allocation | Total GEF allocation |
|---|---|
| Project Preparation Grant | 60,000[5] |
| Technical Assistance / Investment | 1,758,182 |
| **Total** | **1,818,182** |
| Agency Fees | 181,818 for technical assistance/investment) |

At the mid-term USD 1,240,010 of the GEF budget has been spent on technical assistance and investment. This is 70.5 % of the total GEF budget. USD 518,172.22 remains of the GEF funding until the end of project in October 2015. It will be used on further training and amendments under Component 2 and Component 3.

53.4% of the total project budget had been spent by November 2014. This is significantly less than foreseen in the RCE, based on the activities and schedule set out – no detailed budget breakdown was provided in the project document. However, the expenditures to date are in line with the current activities and delays in the project. Table 10 shows how the contribution is broken down by component and between GEF and co-finance. The biggest expenditures have been:

- The phased contract with TTA to carry out the feasibility studies plus the installation and commissioning of five mini-grids was signed in December 2012 plus two subsequent amendments. The overall contract was costed at USD 2,282,833. The inception phase and report was USD 90,000 and the first phase of installation and commissioning was estimated at USD 1.2m.
- A contract was signed in September 2014 for a 6 month period with a local legal practice to develop an Electrification strategy, an Electricity code and to run at least 3 validation workshops for a total sum of USD 38,000.
- EUR 28,050 was committed to HOMER training by ECREEE which was carried out in December 2014.

**Table 10: GEF financial contribution and Co-finance at Mid Term**

| | Project Design (USD) | | | Mid-term expenditure (USD) | | |
|---|---|---|---|---|---|---|
| **Project Component** | **GEF** | **Co-finance** | **Total** | **GEF** | **Co-finance (cash)** | **Total** |
| Component 1 | 50,000 | 50,000 | 100,000 | 55,985.01 | 22,808.70 | 78,793.71 |
| Component 2 | 55,000 | 50,000 | 105,000 | 1,124,558.16 | 620,614.78 | 1,745,172.94 |
| Component 3 | 1,547,182 | 1,556,364 | 3,103,546 | | | |
| Component 4 | 21,000 | 65,000 | 86,000 | - | - | - |
| Project Management | 85,000 | 80,000 | 165,000 | 59,466.61 | 17,755.78 | 77,222.39 |
| **Total** | **1,758,182** | **1,801,364** | **3,559,546** | **1,240,009.78** | **661,179.26** | **1,901,189.04** |
| **% of total or co-finance allocation** | | | | **70.52%** | **36.54%** | **53.4%** |

[5] Plus an additional USD 60,000 from UNIDO

## 1.D.3 Level of co-finance

The total indicative co-finance included in the Request for CEO Endorsement (RCE) was USD 1,801,364 divided between cash and in-kind support from UNIDO (at USD165,000) and cash support from the Government of Chad at USD 1,636,364. A commitment letter of January 2011 from the Ministry of Petrol and Energy was included in the CEO Endorsement document committing Chad to USD 1 million to the GEF project.

USD 708,812.26 was received from Chad on 21/05/2010, prior to the finalisation of the project design.

Following the commencement of the project a Trust Fund agreement was signed between UNIDO and the Government of Chad, represented by the Ministry of Petroleum and Energy, in August 2012 which commits Chad to co-finance of USD 1.8 million[6], GEF finance to USD 2million and UNIDO finance to USD 165,000. Based on this agreement the Government of Chad has still to transfer USD 1,091,211.

In April 2014 the Secretary General confirmed the fund commitment of USD 1 million and that it had been included in the 2014 budget and was going to be transferred to UNIDO. In August 2014 UNIDO had still not received the funds and wrote to the Secretary General stressing the importance of the co-finance and noting that it would not be possible to complete the foreseen work without the funds. The funds are still outstanding and, as described earlier, it will not be possible to achieve the project outputs and outcomes without the funding.

Since the beginning of the project USD 661,179[7] has been spent in co-finance, 36.5% of the amount foreseen. This has been spent on pilot projects, for technical assistance and project management, as seen in Table 10 above. The split between co-finance sources is shown in Table 11. UNIDO have allocated a further USD 10,000 for 2015.The remaining UNIDO financial contribution depends on the receipt of the Government co-finance.

**Table 11: Co-finance committed, received and spent**

| Name of co-financer (source) | Type | Amount in RCE (USD) | Received (USD) | Promised (USD) | Spent (USD) | Notes |
|---|---|---|---|---|---|---|
| Government contribution | Cash | 1,636,364 | 644,374.78 | 1,091,211 | 643,423 | 644,374.78 is 708,812.26 received minus the 10% agency fee. Note –PIR references are made to USD4.1m co-finance – but this is NOT in the RCE. |
| UNIDO | Cash and In Kind | 165,000 | | 10,000 | 77,500 + 17,755.78[8] | UNIDO in-kind contribution has been UNIDO office spaces for PM, project assistant and project management expert; computers and inventory, office costs |
| **Total co-financing** | | 1,801,364 | | | 738,679 | |

In addition to the Government commitment in the Trust Fund agreement, there is also in-kind co-finance that was not included in the project design. This includes the office rental including utilities, the land for the pilot sites and significant time from the local populations at the pilot sites. For example the householders helped in the installation of their house connections, accepted lower than commercial rates for digging the trenches and the Local Association at Mombou meets every week for 30 minutes and is not paid.

[6] USD1.8million includes a 10% agency fee over and above the amount noted in the RCE (USD1.636 million).
[7] As of November 2014
[8] Based on an exchange rate of 1.2 USD = 1 €

**Table 12: Chad in-kind co-finance**

| Type of in-kind contribution | Unit | Amount | Total (XAF) | Total (USD)[9] |
|---|---|---|---|---|
| Rent for office | 2,000,000 XAF/month | 29 months | 58,000,000 | 100,000 |
| Land for pilot sites (estimated) | Douguia, 5 000 000 XAF Mombou 3 000 000 XAF Guelendeng, 7 000 000 XAF | X m2 at each site | 15,000,000 | 25,500 |
| Local labour/time – Local Association and households | 3,500 XAF/day | 130 days @ Mombou for hh connections. | 455,000 | 785 |
| Trench-digging | XAF 800,000 for project at 35% below market rates | | 431,000 | 750 |
| **Total estimated in-kind co-finance** | | | | **~127,000** |

There is also un-recorded co-finance from the project beneficiaries. In particular personnel at MPE and ADER have spent some time working with UNIDO and their consultants on Components 1 & 2.

**In future projects it is recommended to account for in-kind contributions at project design.**

### *1.D.4 Perception of efficiency of results delivered (cost-effectiveness)*

The cost-effectiveness of the GEF project has been assessed through the perception of the stakeholders interviewed, and is assessed as being good. There are no similar projects in Chad to enable a comparison.

Both TTA and ECREEE have delivered in excess of their Terms of Reference. TTA have contributed significant time to the project and included the socio-economic assessment and are also carrying out the operation of the mini-grids for the first year, in addition to the maintenance as agreed in the contract. ECREEE accepted a greater number of participants than included in their ToR, continued the course for longer hours than anticipated each day, have provided a help desk for participants post the training and will also carry out some feedback after six months.

As mentioned above it is important that demonstration sites are selected where there are clear productive users. At Mombou where there are mainly household connections using minimal electricity it may have been more cost-effective to meet their demand with a different technology solution (i.e. stand-alone products). However the aim of the project has always been to increase productive activities and for this a mini-grid can be the most cost-effective solution. In this case additional support would have been appropriate to ensure these productive activities start and thrive.

## E. Sustainability

This Section reviews the Project's sustainability, referring to whether the Project's is likely to continue to deliver benefits for an extended period of time after completion. To gauge sustainability, this included an examination of the risks likely to affect long term outcomes, the likely longevity of benefits from the Project and global environment benefits. This has been assessed through interviews with project staff, project beneficiaries, consultants and government.

9 Based on an exchange rate of 580 XAF = 1 USD

## 1.E.1 Sustainability of project outcomes

Overall it is the Reviewer's opinion that the Project will likely have significant sustainable impacts on the market for renewable energy and mini-grids beyond the duration of the Project. The mini-grids and business models are able to show that electricity access can be sustainable in rural communities. Demonstrating what is possible in terms of technical viability and new business models has the potential to increase the interest in renewable energy, to impact on rural electrification policy and to commit resources to new mini-grids. Added to this are the benefits due to building local capacity in government and the private sector to allow for ongoing project identification and design and supportive legislation. However there are a number of risks associated with the on-going sustainability and since some of the financial risks are significant this has the result that the overall sustainability is only moderately unlikely.

**Table 13: Ratings on sustainability**

| | Rating | Reviewers comments |
|---|---|---|
| **Overall Rating** | **Moderately unlikely** | |
| Financial risk | Moderately unlikely | Significant risks related to the revenues at the demonstration sites and the lack of economies of scale for profitable O&M linked to no government commitment to replicate the model yet. |
| Socio-political risk | Moderately likely | Stakeholder ownership good but greater awareness of benefits is missing. |
| Institutional risk | Moderately likely | Institutional framework being developed but still a risk related to lack of capacity. |
| Environmental risk | Likely | No risks identified |

## 1.E.2 Financial risks

There are significant financial risks that affect the sustainability of the project outcomes, and also further replication. At the demonstration sites if the revenue is unable to cover the cost of management and future equipment replacement then the continued sustainability of the system is questionable. This is a significant risk at Mombou where the current income is less than anticipated. At the feasibility stage of the project the households expressed their interest in using a number of electrical appliances. The system was sized based on this and a number of tariff levels were set. On project implementation almost all households have opted for the minimum tariff (3000 XAF/month) with no appliances. This has meant that the PV system is larger than necessary (at this time) and that the income is significantly lower than expected. There is sufficient revenue to cover the salaries of the management team but the balance will not be enough for all the future equipment replacements required and so will affect the sustainability.

It has been the intention that the demonstration sites would be managed and maintained by a private sector organization, beyond the one year agreement with TTA. To attract private sector operators there needs to be a profit in the business. There are economies of scale relating to the management and maintenance of numerous sites since services and skills can be shared across sites. At the agreed tariffs and with a sufficient fund for future replacements it will not be profitable to manage one site, and it may not be profitable enough for just three sites. If the lack of co-finance limits the number of sites to three there is a significant risk that no private operator will take on the management and maintenance.

With five sites the economics improve and with further sites it can become good business. Prospects for sustainability are therefore improved if the co-finance is received and, more importantly, if the Government commits further resources to more PV mini-grid sites across the country. However there is a strong oil lobby in the country which affects the allocation of finance and could reduce/divert money from renewable energy. In addition any technical risks related to problems at demonstration sites affect the revenues (and so sustainability) and ability to convince government to commit resources.

It is important during the final months of the project that there is significant resource focused at improving the sustainability. It is recommended that this should include:

- Carrying out a review for the best management model for the demonstration projects beyond the one year contract with TTA. Building on the work already undertaken the management model proposed could include private sector participation or community managed systems or a combination of both. The proposal should ensure for a contract of at least 10 years to ensure for incentivisation for saving for future equipment replacements. This work should include engaging with the private sector to assess their interest and skills levels to manage the three/five demonstration sites. As a minimum this should include consultation with TTA, IDEB, Tchad Solaire plus those organizations that attended the training. In addition further consultation is required with the communities on their interest and abilities. Training requirements should be identified and delivered.
- Work with ADER to increase their role and ownership of RE mini-grids in the country. It is recommended that ADER take on a role of supervision of the mini-grid management (under any of the above business models) and work to identify future sites for project replication. It is important that there is clear oversight and monitoring of the mini-grids including checks on the funds for equipment replacement. This supervision role will differ depending if the private sector or community model is taken forward; with greater ADER involvement under the community model – similar to the management of the community based water management systems already in place in Chad. Training needs should be identified and delivered and ADER could already review closely how TTA carries out the management and O&M.
- At a demonstration site level it is important to identify other potential electricity users to increase the revenues.

### *1.E.3 Socio-political risks*

Stakeholder ownership is good and the benefits are understood at both the Government and community level within the pilot villages. This level of ownership should be enough to ensure the sustainability of the existing pilot projects although there is a risk that implications of the level of management and equipment replacement needed has not been fully understood. To mitigate this it is important that the operation and maintenance organization(s) is identified as soon as possible and contracted for at least 10 years to incentivize the savings for replacements. If the role is to be taken by the community then further technical, financial and managerial capacity building is required for the community and also for the Government to enable it to take a greater role in the oversight of the management.

There is insufficient public/stakeholder awareness of the benefits of the mini-grid approach to support further uptake of the concept. This in turn affects the overall sustainability (as the number of systems affects the viability, as mentioned above). **It is recommended to provide some awareness raising activities within the remaining time of the project.**

### *1.E.4 Institutional framework risks*

The institutional framework to allow private sector investment and operation of mini-grids is still not in place, but assuming legal documents developed by this project are adopted then the risk is minimised. However the private sector is not strong and there is limited technical capacity in the country so even with the framework in place there would be limited interest from the private sector in the short-term (to operate and maintain the existing systems, or to invest in new ones). An alternative proposed by a number of stakeholders (including Government) is that the existing systems be managed by the community, as is done in the water sector. This is possible with significant additional capacity building. Note that the lack of co-finance will reduce the impact of the training from this project.

Further project ownership by the government would help allay some of the institutional framework risks.

Accountability and transparency in the O&M accounts should be maintained at the pilot sites to ensure the continued support of the Local Associations.

### *1.E.5 Environmental risks*

No significant environmental risks have been identified which will affect the sustainability of outcomes.

### *1.E.6 Prospects for Sustainability of each Component*

**Component 1: Institutional, policy and financial mechanisms –**This area is likely to have a clear sustainable impact. If the recommendations proposed under this activity are adopted by Government then the framework will be in place to allow for greater community and private sector involvement. Beyond this, it would be necessary to scale up the Government financing in off-grid rural electrification for it to have significant sustainable impact.

**Component 2: Assist project developers with feasibility studies –** The five feasibility studies developed under the project, although not sustainable in themselves, can help to increase understanding of renewable energy and mini-grid business models and therefore build up capacity. In addition the Project's approach of training Government and private sector actors means that capacity building can have a sustainable impact post-Project in terms of identifying and planning for future projects.

**Component 3: Technology demonstration –** The three mini-grids have been designed with a sustainable model that was intended to ensure that the on-going operation and maintenance is covered by the revenues from the customers. As discussed above there are risks to the sustainability due to lower revenues than expected and due to too few mini-grids being developed. However if proven to be sustainable they will have a major impact on the Government decisions to commit resources to further mini-grids and therefore increase viability and sustainability nationwide.

### *1.E.7 Integration of sustainability into the project*

Sustainability was built into the design of the project in as much as changes in the legal framework would allow for more actors in the provision of mini-grids and capacity building results in permanent change; both of which allow for further replication and sustainability. In addition sustainability was clearly considered at all stages of the demonstration projects. It was allowed for at design with the idea of a private – public partnership and once TTA were contracted they designed a clear system where the tariffs were designed to cover the costs and future equipment replacements and training is carried out to ensure lasting skills. As outlined above it was intended that a private operator would then take on the management and maintenance. However as described not all the assumptions made at the design stage have proved to be correct so at one of the demonstration sites, Mombou, the revenues are lower than expected. In addition assumptions were made on the basis that there would be five demonstration sites over which costs could be shared.

## F. Assessment of monitoring and evaluation systems

This section reviews the extent to which the project has and uses an effective monitoring, reporting and evaluation framework. To gauge this, the project documents at design and for implementation are reviewed and project management staff were interviewed.

**Table 14: Ratings for Monitoring and Evaluation**

| | Rating | Reviewers comments |
|---|---|---|
| **Overall Rating** | **Moderately satisfactory** | |
| M&E Design | Unsatisfactory | M&E at design did not include a "concrete and fully budget plan" with SMART indicators for all results and was not in line with GEF Minimum Requirements for M&E. |
| M&E Plan Implementation | Moderately satisfactory | Although there is regular ad-hoc reporting and monitoring it does not include monitoring against the |

| | | |
|---|---|---|
| | | project results framework or SMART indicators. |
| Budgeting and funding for M&E activities | Satisfactory | Sufficient budget was allocated but there is not clarity on its expenditure and some inconsistencies. |

## *1.F.1 M&E design*

The M&E plan at the design stage included a weak Project Results Framework and the intention that a detailed monitoring plan would be prepared at the beginning of the project and that "UNIDO will closely monitor and review the progress of the project activities through periodic meetings, field visits and consultations".

Although this 'plan' implies monitoring results and tracking progress towards achieving project objectives, the plan did not include a "concrete and fully budgeted plan" with SMART indicators for all results and a baseline as set out in the GEF Minimum Requirements for M&E.

The Project Results Framework included some SMART indicators at outcome level. However no indicators are provided for outputs, not all targets provided are consistent with the activities described and the baseline is not provided for all the targets.

A monitoring plan was subsequently developed in 2013 and has been approved by the PSC. This included some further indicators but did not include indicators for more detailed outputs or outcomes and did not include targets for all the indicators (and only included Phase 1 of Component 3). Further detail is included in Annex E. In addition TTA has proposed a number indicators for the socio-economic impact of the pilots in the three villages.

## *1.F.2 M&E Plan implementation*

M&E activities were to be based on the Results Framework provided in the CEO document and on an M&E plan to be designed at the outset of the project. However, as mentioned above, no M&E plan was prepared at the outset. An M&E plan was prepared in 2013 which covers some of the outputs and some of the management activities but it is not clear how frequently it is up-dated, or indeed if it is, nor how it informs further work or management. In addition according to UNIDO, a detailed work plan for the entire duration of the project has been developed in collaboration with the PCU and Ministry counterpart. The work plan is supposed to be used as management and monitoring tool by PCU and UNIDO and is to be reviewed and updated appropriately on a yearly basis.

In reality annual workplans have been approved by the PSC in April 2013 and in April 2014. The initial workplan (2013) was based on the activities in the project design document and the second workplan includes an updated, more realistic, workplan which reflects the actual project activities. It is not clear how much reporting is done against this workplan. Reporting against the activities is included in the responsibilities of the local PCU but they have not completed the plan. Instead consultant reports, ad-hoc progress reporting and emails are provided as well as updates on field visits.

Use of the results framework is limited and there is no formal reporting on the project beyond the PIRs. UNIDO has submitted regular PIRs to the GEF secretariat (June 2013 & June 2014) reporting progress against updated outcome indicators. In addition there has been ad-hoc reporting to GEF in response to demands for information.

Although reporting is limited to the PIRs many of the activities that would be included in an over-arching M&E plan have been taking place. A summary of the reporting and monitoring taking place is provided in the following descriptions and table. The main activities missing are:

- Active use of SMART indicators;
- Use of a results framework i.e. formalised reporting of all the activities and outputs in one place against indicators for outcomes and outputs; and
- Regular progress reporting. No progress reporting was envisaged at design. UNIDO keep up to date with regular emails, phone calls, visits and progress reporting from the main sub-contractor,

TTA. TTA have provided progress reports against their deliverables between March 2013 and July 2014. A further report is due once the three pilots are completed.

The sources for verification within the RCE Results Framework included only monitoring reports and site visits, end of project survey, the mid-term review and final evaluation. In reality the sources of verification for monitoring are the reports outlined in Table 15 plus copies of training material, copies of contact logs, participant logs and evaluation forms from the training sessions plus copies of Terms of References and contracts for the work not yet completed.

It is recommended to formalise some of the M&E processes to ensure that all activities are clearly documented. Specifically it is recommended that progress should be demonstrated regularly against indicators in a Revised Results Framework.

**Table 15: Monitoring of the project**

| Type of M&E activity being undertaken | Remarks / Evidence |
|---|---|
| PIR | UNIDO PIR June 2013 & June 2014 |
| Project Steering Committee (PSC) Meetings | PSC formed and meets regularly. Copies of minutes available.<br>Local project co-ordinator keeps MPE up to date with short progress reports/letters. |
| Informal internal reporting | Minimal progress reporting via email from local co-ordinator to UNIDO HQ |
| | Back to office mission reports (BTOR) from UNIDO HQ visits to Chad |
| Inception Report from contractor, TTA, for part of Component 2 and Component 3. | Inception report received in March 2013 including activities undertaken and feasibility studies for five identified sites and it also included some proposed socio-economic indicators for the work on site. |
| TTA progress reports | Three progress reports received from TTA detailing progress to date for Component 3 (December 2013, June 2014, July 2014) |
| Visits to field sites | Carried out by local project co-ordinator and reports sent to UNIDO HQ. |
| | Carried out by UNIDO PM when in Chad. Updates included in BMOR. |
| Training evaluation report | Report expected from contractor, ECREEE, on training. |
| Mid-term Review | Underway |
| Terminal Project Evaluation and Report | Foreseen - Due at the end of the project |
| Audits | Project included within overall UNIDO auditing |

## *1.F.3 Budgeting and Funding for M&E Activities*

The budget available for M&E at project design (in Table A) was USD 86,000 to include the implementation of the M&E plan, publications on lessons learned and toolkits produced and disseminated and information on mini-grids covered in national media. In parallel the budget under the M&E plan included for USD 56,000 but was only allocated against the final external evaluation and the dissemination of lessons learned. It is assumed that these two costs relate to the same activities and that the difference in budget is foreseen to come from the Chad government co-finance. The budget allocated for these activities is sufficient.

No budget was allocated for a mid-term review.

The current budget expenditure on the implementation of monitoring during the project cannot be evaluated because it is not clear and as it is incorporated into the management costs shown in Table 10.

# G. Monitoring of long term changes

At the project design stage there was no provision for monitoring of long-term changes. However each demonstration site will be able to measure GHG emissions avoided. As part of the equipment installed at each PV hybrid power station there is metering equipment which will allow for detailed monitoring of energy generated and delivered in kWh. This data can be recovered by modem and is already operating at Mombou. It is possible to calculate the GHG emissions avoided from the kWh figure. This system is sustainable as long as there is an entity responsible for the operation and management of the system they will have access to the data.

# H. Project co-ordination, Implementation approach and management arrangements

This section reviews the efficiency and effectiveness of the implementation and project management approach to date, including the use of flexible management as originally set out in the Project design and the appropriateness of any changes made during implementation. The section also includes the extent to which the Project was well prepared and ready to implement at start of project as well as donor visibility.

**Table 16: UNIDO specific ratings**

| UNIDO Specific Ratings | | Reviewers comments |
|---|---|---|
| **Overall Rating** | **Satisfactory** | |
| Quality at entry / Preparation and readiness | Moderately unsatisfactory | The project was not well prepared and ready to implement at the start of the project in June 2012. In particular there was a lack of consistency and detail in the design of the activities so it would have been difficult to procure services against the level of detail provided in the RCE. |
| Implementation approach | Satisfactory | Project management has been appropriate and for the most part effective and efficient. |
| UNIDO supervision and backstopping | Satisfactory | UNIDO's supervision and backstopping of the project has been satisfactory. UNIDO staff have provided suitable support and have re-designed elements of the project when needed. UNIDO staff have been available when needed and any significant issues raised are resolved through headquarters rather than at a local level. |

## *1.H.1 Extent to which the Project was well prepared and ready to implement at start of project*

The project was not well prepared and ready to implement at the start of the project in June 2012. In particular there was a lack of consistency and detail in the design of the activities so it would have been difficult to procure services against the level of detail provided in the RCE. This is evidenced by the fact that a new work plan had to be proposed once the new UNIDO project manager took over. Despite this a call had been issued in December 2011 for the design, installation and commissioning of the five pilot sites. This should have helped with the quick start up but due to the lack of clarity in the Terms of Reference this did not speed the process up.

The counterpart resources were not in place at the start of the project, in particular the Government funding. The Chad government had submitted more than USD 700,000 to UNIDO but USD 1,091,211 was still outstanding at the project start. Shortly after the project start the Government officially committed to providing the funds in the Trust Fund agreement signed in August 2012. However these funds have not been forthcoming.

The project management was not clear at the project start with the Project Steering Committee only being established in April 2013. This delay was partly so that it was possible to demonstrate some

results at the first meeting (from the inception mission of TTA). At the same time approval was provided for the recruitment of the local project co-ordinator. Prior to this point there was no local project manager.

## *1.H.2 UNIDO's Implementation approach*

UNIDO's implementation approach is in line with its approaches on other projects and is appropriate for this project. The project is managed from Vienna with a local project co-ordination unit (PCU) in N'Djamena consisting of a project co-ordinator and project assistant. The responsibilities of each are clearly outlined. Despite this there have been communication breakdowns between the HQ and local PCU and there has been limited monitoring and reporting from the local PCU. To ensure regular updates UNIDO HQ mitigate against this by frequent phone calls, emails and regular visits.

The approach has relied on a number of sub-contracts to carry out the activities, and in particular one large sub-contract with TTA to carry out the feasibility studies, design, implementation, commissioning and one year maintenance of the pilots. This is an effective approach and has made sense to have the same organization prepare the feasibility studies and carry out the implementation since this avoids the situation where the contractor does not agree with the final design. Lessons learned during Phase 1 can be used in Phase 2, if it goes forward.

The UNIDO approach has been flexible which has been demonstrated by amendments to their approach within the different project components in line with country needs and resources available. For example activities and outputs have been adapted, as detailed earlier, to new situations:

- More specific requirements from Ministry of Energy and Petrol has led to the design of activities relating to the regulatory and institutional framework and training needs.
- Component 3 was designed as a two staged approach to take into account risk of non-receipt of Government co-finance.

A Project Steering Committee was established in April 2013 at the official project launch in country. A second meeting was held in May 2014 and a third in September 2014. The roles and responsibilities of the PSC and PCU are clearly set out in the project documents and 'arret'. Its roles include providing advice and feedback and to support implementation. It meets regularly but due to high staff turnover there is little Government consistency. However clear decisions have been made on how to phase the demonstration projects, on validating the business model and tariffs, and on approving the workplan. In addition technical issues relating to the construction of the buildings and the use of underground cabling have been raised at the PSC.

The involvement of the PSC in the project has actively promoted local ownership for the project and through the project activities capacity is expected to be built within Government – particularly on the policy side through consultation and workshops with the legal consultants. The reporting and inclusiveness of the appropriate Chad Government stakeholders has mainly through the PSC as well as letters and short progress notes on an ad-hoc basis. One of the challenges is the fast turnover of staff. The staff at the Renewable Energy unit and in ADER had only been in place for two months when the review team met them. As a result they were not fully briefed on the project.

## *1.H.3 UNIDO's supervision and backstopping*

UNIDO's supervision and backstopping of the project has been satisfactory. UNIDO staff have provided suitable support and, as detailed earlier, have re-designed elements of the project when needed. UNIDO staff have been available when needed and, when required, any significant issues raised are resolved through headquarters rather than at a local level. This is done both through phone calls, emails and visits. Staff from UNIDO HQ have visited at regular intervals to assess progress and to help on resolving issues. In addition the local co-ordinator has made regular visits to the project sites to help resolve local issues and to review work progress.

### 1.H.4 Cost effectiveness/efficiency of management

For the most part the project management has been effective and efficient. UNIDO have clear roles and responsibilities for the HQ and PCU and are adequately resourced for their project management. With this management structure they have started to fulfil their goals in line with those set out in the results framework, although behind schedule. The use of one large sub-contract is also an efficient use of resources and moves some of the risk of implementation to the sub-contractor, TTA.

As mentioned above there have been communication break-downs between the PCU and Vienna HQ. This lack of availability of local co-ordination at times has resulted in more Vienna HQ management time in phone calls and chasing up (adding an extra step in overall management) which implies a lack of efficiency. It is difficult to know how to remedy this situation when the appointment of the local project co-ordinator is political and was proposed by the MPE, and is a MPE staff member. This has meant that consultation with the Government counter-part and with local communities has been very efficient but other elements of reporting and monitoring have been lacking. Related to this appointment it is unclear where the project co-ordinator's priorities lie, between UNIDO and the Government, which can make for difficult management at times.

When significant issues are raised, for example co-finance issues or decisions on distribution lines, these must be resolved from UNIDO HQ which can be difficult at a distance and is not an efficient method.

The percentage of budget spent on project management versus other activities is 4.1%, as shown in Table 10. At project design project management was envisaged to take up 4.6 % of the total budget. Therefore the project management spend to date is considered appropriate.

### 1.H.5 Financial planning

Financial planning for the project has been adequate and appropriate since the new manager took the project over in October 2014. At that time a significant revision of the budget was carried out and a new budget plan was put forward. The budget plan allowed for phasing of the project so that activities could continue prior to receipt of the outstanding co-finance.

The budget and expenditures (from GEF, UNIDO and Government co-finance) are managed through SAP, since 2013, and are reviewed on a regular basis and any unspent funds at the end of the year are re-phased for the following year. The budget and expenditure is discussed when necessary with the project manager.

Audits are carried out by external and internal auditors as part of overall UNIDO auditing. This project is therefore included within this.

Generally the disbursement of payments has been satisfactory. However delays in the release of the first advance payment to Sylvanus caused a delay in the commencement of the legal framework work.

### 1.H.6 Risk management

The project's Risk Management strategy has been followed although not all risks and risk mitigation are reported on, despite the continuing importance of some of these risks (eg. technical and oil prices). As reviewed in the project design, overall the risks were reasonably well-identified. Further risk was identified relating to co-finance during the project. UNIDO has already identified this risk and included it in its PIR. While UNIDO's management has been working to mitigate against this risk, it remains significant; the co-finance has still not been received.

The key risks outside the control of the project management team are the fall in international oil prices and the security and stability of the country. Falling oil prices undermine some of the economic advantages of PV and therefore may reduce the number of paying customers thereby affecting the

sustainability. In addition if the threats from Boko Haram destabilise the country and increase security risks it will be difficult to operate in Chad and to finalise the demonstration projects.

It is recommended that all the risks, not just some, should be tracked for the remaining project implementation. Further details on all the risks, and which are reported upon, are included in Annex E.

### *1.H.7 Integration and communication of lessons learned*

The PIR is a formal mechanism for integrating and communicating lessons learned. They are not included in the UNIDO PIR. The Reviewers recommend that formal reporting of lessons learned is included in each PIR.

The M&E plan at design included a budget for 'Dissemination of Lessons Learned' yet there are no activities planned or detailed as to how this will be done. It is recommended that a communication matrix should be prepared setting out the best ways of doing this by determining which findings or documents should be prepared and with whom they should be shared and how best to reach them.

Informal learning within UNIDO has successfully resulted in changes to approaches as shown by their flexible management and project amendments.

### *1.H.8 Donor visibility*

Donor visibility was assessed based on evidence of the use of donor's logo, and mention of the donor's role in the Project in official notices, reports and publications referring to the Project.

There are only a few project documents and almost none in the public domain. TTA has published five project bulletins under the name ERDET – Electriciation Rurale pour le Developpement Economique au Tchad. This project title also has a logo but has not been used outside of the TTA literature. These bulletins include UNIDO and MPE logos (but not GEF). TTA's progress reports to UNIDO include the same labelling.

The training material delivered by ECREEE did not include mention of UNIDO or GEF, or their role in the project. It is recommended that UNIDO communicate to their consultants the appropriate use of donor's logos for all outputs to increase visibility.

There is no identification at the project sites of who funded the project or what the project is. It is believed that panels are due to be installed but these were not seen.

## I. Assessment of gender mainstreaming

This includes an assessment of the extent to which socio-economic benefits delivered by the project include consideration of gender dimensions. This has been assessed through interviews and desk review of reporting of the gender balance in beneficiaries and the perception of gender balance, as well as the extent to which gender was considered during the design and implementation of the project.

At the mini-grid pilot sites TTA have conscientiously included women at all stages of the project, as far as possible. Consultation was carried out with the existing women's associations and lending groups. At times it has been difficult since men are more visible and make all the decisions within the communities. The design specifically included consultation with women and their energy needs and the Local Associations each include a Women's representative. The Local Association in Mombou has 2 women out of 6 members; one the Women's representative.

It is still too early to see the impact specifically on women at Mombou. Everyone benefits from the reduced costs of mobile charging and better lighting. The women's representative, when asked, said that the light and phone charging was nice and allowed for more time to gossip and meet in the light. This allowed for more time to discuss ideas but it is not possible to develop these ideas without further means such as finance and training.

In other activities there has not been any specific targeting. One woman, a stagiare from ADER, was included in the Homer training (out of 35). Although this number is low it is clear that there are few women employed in the target organizations.

# J. Procurement issues

This project has included procurement of the national co-ordinator and assistant, of local team equipment and car, consultants for the legal work and training provision plus contracting for the design, implementation and commissioning of the mini-grids. There have been no serious issues that have impacted on the outputs of the project. The procurement has been relatively timely considering the issues and, to date, contracts have delivered the expected quality.

The largest contract is with TTA which was awarded based on the Lowest Cost Technically Acceptable offer. An open call was issued for the work in December 2011, six months prior to the start of the project and prior to CEO approval of the project. Although premature this allowed for the possibility that the project could start quickly. However the ToRs were not very clear, inconsistent and presented a number of questions which, at that time, no one at UNIDO could answer. Nothing further was done on the project until the new project manager became involved in October 2012. At that time TTA were invited to negotiate. TTA expressed serious doubts regarding the pre-feasibilities and design in the project document which UNIDO agreed with. Therefore the solution agreed upon was to increase the scope of the inception phase to include a greater level of detailed technical and socio-economic analysis and design than was originally intended. This flexibility allowed greater knowledge to be gathered to be able to present realistic designs (and pricings) for the five sites. The contract was signed in December 2012.

UNIDO was transparent about the need for phasing of the five villages based on the receipt of the Government co-finance. TTA's bid was based on unit prices and they were happy with the phased approach which not only allows for delay in finance but also to learn from the first sites. The first contract amendment was signed in July 2014 following the detailed review of the feedback from the inception mission; some adjustments needed to be done and thereafter the roadmap was cleared and the amendment signed.

Payments are on the basis of deliverables and there are a number of checks built into the process – for example Inception Mission, pre-shipment inspection, dividing the number of villages so lessons can be learned from completed works, briefing missions in Chad, Vienna during the execution of the contract, several conference calls and reports. The cost of transportation (from Barcelona to N'Djamena) was included in the contract so the additional costs for a security convoy through Cameroon was met by TTA. There was a delay at customs but it was cleared relatively quickly (2.5 weeks) via UNDP with considerable chasing.

The key lessons learned from this process has been the flexibility as well as project team keeping the procurement department informed and well in advance so pro-active measures could be taken rather than reacting to the situation.

The contracts for the legal consultants (Sylvanus and Toby Couture) were publically tendered and the least cost provider was awarded the contract with support from an international consultant. A six month contract was signed in September 2014. Any delays in procurement were due to delays in finalizing the ToR and in finding a local contractor.

The TOR for the Homer training was published in August 2014 and ECREEE were approached by UNIDO to see if they would be interested. Following submission of a proposal the decision was made quickly; within two to three weeks. There were no delays in procurement.

A local-coordinator was nominated by MPE and the final recruitment had to be approved by the Project Steering Committee and MPE. This took place after the project had started with the approval from the PSC nine months from project start. To speed up project start-up it would be useful to recruit the local project coordinator at project start.

# 4 Conclusions, recommendations and lessons learned

## A. Conclusions

The analysis carried out for this MTR indicates that the Project is on the right track and has made noticeable progress towards expected outputs and outcomes, but it is significantly behind the original schedule. There is a significant risk that the project objectives will not be realised due to the lack of co-finance.

### Project design

The original project design is still relevant to the country context and addresses key needs and market barriers to renewable energy and rural electrification in Chad. The Project is timely and fits well with UNIDO's organizational strengths and priorities – as well as with policy and priorities of the Chad Government.

The three project components and their outlined activities are *generally* highly relevant for addressing the barriers to renewable energy and rural electrification for productive uses. However the specific activities and baselines relating to all three Components were inadequately detailed at the project design stage.

The GEF "Project Results Framework" in the CEO document should detail the Project's objectives, the objectively verifiable indicators, targets, sources of verification and assumptions for each of the project activities, for the project outcomes and overall project impact. However in this case the project results framework provides only a framework for the project outcomes' indicators; i.e. the framework does not provide verifiable indicators and targets for each of the foreseen project activities or outputs. That said some of the indicators stated refer directly to activities.

Overall there is a lack of consistency between the description of the project and what was included in the results framework at project design and displays a lack of understanding between outputs and outcomes. This lack of clarity makes it difficult to really understand all the expected outputs and outcomes of the project at project design.

The Project design was too optimistic in some of its assumptions – and consequently targets and timeframes – and did not adequately anticipate some implementation risks:

- An assumption in the project design, which was never made explicit, was that the private sector was sufficiently developed, strong and interested in renewable energy investments. However this is not the case and the Chad private sector is weak and there is little knowledge of renewable energy in Chad. Another unstated assumption relates to the ease of operating in Chad. These two (implicit) assumptions meant that the project design under-estimated the challenges (and time) in working in Chad and with engaging with the private sector.
- The other key assumptions, relating to Component 3, are based on the reliance on the feasibility studies carried out at project design. Because these studies were not sufficient robust the size of the systems, energy generated and the number of connections are all overly ambitious; the targets for kW and kWh (in the text not in the results framework) and thus the targets for GHG emissions avoided are therefore not likely to be met within the project. This is a fault of the Project's initial design.
- In addition, project risks identified in the original Project design did not take adequate account of the risks associated with the receipt (or non-receipt) of the co-finance and underestimated the risks associated with oil price falls and technical problems.

Despite some overly optimistic targets, the overall Project approach appears to be appropriate and of continued relevance. The overall Project's logic is strong though there have been a number of amendments, mainly due to a lack of clarity and consistency in activities described in the project

document. No major amendments have been made to the impact or outcome targets but these targets should be revised downwards in line with realistic assumptions.

The project design appropriately allowed for coordination between UNIDO headquarters and the local PCU. The reviewers also believe that the schedule for the project was ambitious since it did not allow for sufficient start-up time, nor for the challenges of working in Chad.

### Effectiveness (overall rating – satisfactory)

Overall, the Project is on the right track and has made noticeable progress towards expected outputs and outcomes, but it is significantly behind the original schedule.

Work under Component 1 has been flexible in line with MPE's requirements and is likely to achieve its objectives by the end of the project.

Progress has been made towards meeting the output-level targets to be achieved for Component 2. The main achievements in Component 2 have been the preparation of detailed feasibility studies for five sites and the start of the renewable energy capacity building.

Good progress has been made towards meeting the output-level targets for Component 3. At the time of the MTR two PV-hybrid power plants have been constructed with a total capacity of 80.6 kW at Mombou and Douguia, and civil works have been carried out at Guelendeng. In Mombou the PV power plant equipment (39.6 kWp), distribution lines and household connections with electricity meters/dispensers to 134 connections have been installed. The plant has been running since June 2014 and 11,200 kWh has been generated which has offset 10 $tCO_{2e}$. At Douguia the distribution lines and connections is starting now and 54 connections are foreseen while construction of the power plant at Guelendeng has just started.

In addition to the technical mini-grids, significant work has been done on the design of appropriate business models for the mini-grids and the establishment of Local Associations and management teams as well as the associated tariff setting and on-the-job training.

There is a significant risk that the project will not achieve its overall development objectives within the project timeframe. The largest constraint to achieving all the project results and outcomes is the budgetary situation with the absence of the remaining co-financing from the government. Numerous and continuous attempts have been made by the UNIDO management to advocate for a transfer of the remaining financial contribution however it is has still not been received by February 2015.

In particular if co-finance does not materialize then the following results will be lower than forseen: kW installed, (112 kW rather than 157 kW), GHG emissions avoided (1590 rather than 2235 $tCO_2$ e), number of connections (219 connections rather than 300 connections).

Overall, it appears that the inputs and outputs by UNIDO and their consultants have been of a high quality and have clearly met the beneficiaries' needs. All stakeholders consulted were very happy with the quality of the work to date. However there have been a few issues, specifically related to the management of expectations and the technical solutions at the mini-grid sites.

There was consensus from all stakeholders that the consultation and collaboration with them had been excellent and inclusive. There is a clear perception from the stakeholders consulted during the MTR that the project is already providing added value.

### Efficiency

The MTR team considers that an appropriate balance between impact and resources has been achieved, and the Project is being efficiently implemented. Although activities are behind schedule, stakeholders interviewed did not raise any serious issues regarding the timing of their delivery.

At the mid-term 70.5 % of the total GEF budget has been spent on technical assistance and investment. 53.4% of the total project budget had been spent by November 2014. This is significantly less than foreseen in the RCE, however, the expenditures to date are in line with the current activities and delays in the project.

### Monitoring and evaluation (Overall rating – moderately satisfactory)

M&E activities were to be based on the Results Framework provided in the CEO document and on an M&E plan to be designed at the outset of the project. However no M&E plan was prepared at the outset and the Results Framework was weak; it included some SMART indicators at outcome level but no indicators are provided for outputs, and not all targets provided are consistent with the activities described plus the baseline is not provided for all the targets. The plan did not meet the requirements set out in the GEF Minimum Requirements for M&E.

In implementation, use of the results framework is limited and there is no formal reporting on the project beyond the PIRs. UNIDO has submitted regular PIRs to the GEF secretariat (June 2013 & June 2014) reporting progress against updated outcome indicators. Although reporting is limited to the PIRs many of the activities that would be included in an over-arching M&E plan have been taking place. The main activities missing are the active use of SMART indicators and formalised reporting of all the activities and outputs in one place against indicators for outcomes and outputs.

### Implementation and Management (Overall rating – satisfactory)

The project was not well prepared and ready to implement at the start of the project in June 2012. In particular there was a lack of consistency and detail in the design of the activities so it would have been difficult to procure services against the level of detail provided in the RCE. In addition the counterpart resources were not in place at the start of the project, in particular the Government funding.

UNIDO's implementation approach is in line with its approaches on other projects and is appropriate for this project. For the most part the project management has been effective and efficient. UNIDO have clear roles and responsibilities for the HQ and PCU and are adequately resourced for their project management. With this management structure they have started to fulfil their goals in line with those set out in the results framework, although behind schedule. The use of one large sub-contract is also an efficient use of resources and moves some of the risk of implementation to the sub-contractor, TTA. However communication break-downs between the PCU and Vienna HQ and the lack of availability of local co-ordination at times has resulted in more Vienna HQ management time in phone calls and chasing up (adding an extra step in overall management) which implies a lack of efficiency.

### Sustainability (Overall rating – moderately unlikely)

Overall it is the Reviewer's opinion that the Project could have significant sustainable impacts on the market for renewable energy and mini-grids beyond the duration of the Project. The mini-grids and business models are able to show that electricity access can be sustainable in rural communities. Demonstrating what is possible in terms of technical viability and new business models has the potential to increase the interest in renewable energy, to impact on rural electrification policy and to commit resources to new mini-grids. Added to this are the benefits due to building local capacity in government and the private sector to allow for ongoing project identification and design and supportive legislation.

However there are a number of significant risks associated with the on-going sustainability of the mini-grids, particularly financial risks due to the reduced revenues being collected at site (at Mombou) which means that there are not enough funds to cover the cost of future replacements. In addition the lack of co-finance means there is a significant risk that no operator will take on the management and maintenance for just three sites due to the lack of economies of scale. The sustainability of the business model proposed will be partly dependent on an increase in the number of mini-grids to ensure that there is sufficient viability to attract a private sector actor to maintain and operate the systems. Without clear commitment from Government to roll out these systems the long-term sustainability is limited.

## B. Recommendations

The recommendations given below result from the review findings and are targeted at the project implementer, UNIDO. They are broken down between recommended amendments to the overall project design (with and without co-finance) and to project implementation to improve reporting and outcomes.

### *1.B.1 Project design*

It is recommended that a new Project Results Framework is prepared which reflects the amended activities and targets and includes SMART indicators for each output and outcome. A draft has been proposed by the Reviewer and is included in Annex G.

It is recommended to set a final deadline of 27th March 2015 for funds to come through from the Government.

Realistic targets should be allocated to each indicator in the revised Project Results Framework for two scenarios – one with co-finance and one without co-finance.

#### With co-finance

If the finance arrives then the Project would need to be extended by at least six months to March 2016. For the use of GEF funds beyond October 2015, this will require an official request to the GEF Secretariat by UNIDO.

#### Without co-finance

If the co-financing does not come through, the project should still complete by October 2015.

Without co-finance UNIDO must identify and finalise the activities to be completed in the next months. This could include at least two more additional training sessions, responding to some of the requests from the pilot communities, identifying and training an operator and Government and carrying out some awareness and dissemination activities.

### *1.B.2 Project implementation*

#### Improve Reporting, Learning and Dissemination

Although there are a number of good monitoring and reporting activities being carried out it would be good to have a more systematic reporting framework – i.e use the revised results framework for assessing progress.

Develop a system to clearly report changes in design so any changes can be easily tracked.

In addition, in the PIR include explicit tracking of risks associated with technical solutions, security and oil prices since these have all shown to be more important than assumed at the design stage, or in subsequent PIR reporting.

There is no clear system to capture learning and lessons learned. A system should be established to capture lessons learned and it is recommended that a communication matrix should be prepared setting out the best ways of doing this by determining which findings or documents should be prepared and with whom they should be shared and how best to reach them.

Greater public awareness is needed of the project to help with replication and therefore sustainability. UNIDO should assess whether to add some awareness raising activities with the final months of the project.

Donors' logos should be put on all applicable materials (including reports and presentations and on boards at project sites).

#### Improve Sustainability prospects

A number of recommendations relate to the sustainability of the impacts and further mitigation measures that can be implemented in the final months of the project to improve the likelihood of sustainability.

The process of identifying future demonstration site operators needs to start now. This process needs to review the prospects of private sector actors taking on the management as well as the possibility of community owned business models. Significant consultation is needed with the communities and potential private sector providers to understand their requirements, their limitations and willingness.

Under either scenario contractual arrangements should ensure the management of at least 10 years to incentivize for the saving for equipment replacements. Considerable training will be required for either option.

Work with ADER to increase their role and ownership of RE mini-grids in the country. It is recommended that ADER take on a role of supervision of the mini-grid management (under any of the above business models) and ADER work to identify future sites for project replication. It is important that there is clear oversight and monitoring of the mini-grids including checks on the funds for equipment replacement. This supervision role will differ depending if the private sector or community model is taken forward; with greater ADER involvement under the community model – similar to the management of the community based water management systems already in place in Chad. Training needs should be identified and delivered and ADER could already review closely how TTA carries out the management and O&M.

To improve the financial sustainability at the demonstration site level it is important to identify other potential electricity users to increase the revenues.

## Specific Recommendations for Components

**Component 1 - Institutional framework**

Since there have been no outputs from the legal component of the work it is important that UNIDO keeps a close eye on the development of the framework to ensure that outputs are in line with Government requirements. It is important that the validation workshops are meaningful in terms of input and that the private sector is properly engaged in the process. If a community owned business model is finally decided upon ensure that the legal framework also allows for this.

**Component 2 - Training**

Further training is foreseen in the remaining project (with and without co-finance). Consultation should be carried out with the stakeholders to identify their priorities for the next training sessions. This needs to happen as soon as possible to ensure it can take place within the project timescale.

**Component 3 - Demonstration sites**

It is recommended that communication of expectations at demonstration sites needs to improve for the remaining Phase 1 sites and also for Phase 2, with respect to timing, tariffs, pre-payment systems, street lights, connections and distribution lines.

A number of issues have been raised related to the current work. To ensure continued buy-in from the community and to enhance sustainability it would be worthwhile to implement some of their suggestions and to provide some additional training. In particular this relates to security lighting around the Mombou power site, increasing the street lighting to that foreseen at feasibility, providing additional training to the management team on the whole system and to the local associations on their various roles.

**With co-finance**

In addition if the co-finance materializes before the deadline (27th March 2015) ensure clear agreement on all aspects of project design with all stakeholders (UNIDO, TTA, PSC & local beneficiaries) prior to procurement in Phase 2.

# C. Lessons learned

A number of lessons learned can be derived from the experiences of this project which will have wider applicability for the design and implementation of future projects.

**Clear communication during project implementation cannot be under-estimated.** Clear communication is very important to manage expectations and avoid future misunderstandings. During this project there were early visits to the pilot villages during the project design which may have raised the expectations of the community about the level of service to be provided. This causes problems down the line when it becomes apparent that budgetary constraints will limit the coverage and service available.

**Sufficient detail to take the project forward is required at the PPG stage**. In this project the activities related to the regulatory and institutional framework were not sufficiently detailed to take forward and so needed significant consultation to develop the Terms of Reference. In addition the feasibility studies undertaken for the pilot sites were insufficient and not technically robust. A greater level of detail is needed at the design stage.

**A more holistic approach to some electricity access projects would significantly increase the impact of the project on local beneficiaries**. In remote undeveloped areas a more holistic approach is needed to ensure delivery of all the potential impacts – for example electricity alone will not develop productive activities if there is also a need for awareness raising and micro-finance to set up businesses. In future projects where electricity is to be provided in very undeveloped areas additional activities relating to enterprise development should be included.

Where productive activities are key to sustainability the selection of demonstration sites should include a thorough assessment of the real likelihood of business customers and **choose only those sites where productive activities can be assured**.

**Be realistic about working in difficult business environments** and build into the project design. Chad is a particularly difficult country to work within; the World Bank rank it at 185 out of 189 in its Ease of Doing Business index. This means that many activities take longer than they would in other environments and that assumptions made on the ability of the private sector to take a role are over-estimated. It is important that there is a thorough understanding of the challenges to doing business in the target country and that realistic assumptions are made and sufficient time and effort is built into the project design.

**Build in project start-up time** into the project design. This is for two reasons: one is to assess the project design against changes in context and secondly to allow for project teams to be put in place. In many cases there is a significant delay between the project design, its approval and the project start. During that time changes to the country context can occur which require a review of the relevance of the proposed project activities so delaying real project work. Project teams are not instantly available. Where the proposed implementation approach is to sub-contract various activities the time associated with this should be included within the project design. Where there are strict tendering rules this can easily add six months to the programme.

**Remember to include in-kind co-finance and be realistic about country's ability to commit cash**. All GEF projects require commitments of co-finance which are agreed at project design. The Government of Chad committed to a high level of co-finance, partly due to the removal of other project partners during the project design process, and despite promises, this has not been forthcoming. In retrospect it may have been unrealistic to expect such high co-finance in cash. At the same time it is important to recognize the in-kind co-finance available.

**Designing in adaptive management has worked well and allowed project to be flexible**. Allowing for flexibility in this project has been key to the project achieving progress. Initial plans allowed for in the design were not appropriate and flexible management has allowed UNIDO to change the approach accordingly. Similarly flexibility has been important to meeting the demands of MPE.

# Annexes

# A. Stakeholders consulted and Mission schedule

| Organisation | Key Participants | Role | Relevance to the review | Date |
|---|---|---|---|---|
| UNIDO | Manuel Mattiat | Project Manager | Project Manager | 27/01/15 |
| | Abdelkarin Dangageymi | Local project co-ordinator | Local project co-ordinator | |
| | Jana Imrichover | Project administrator | Project management | various |
| | Diego Masera | Project Manager | | 26/02/15 |
| | Aymen Ahmed | Procurement services | Procurement | 02/02/15 (email) |
| Ministry of Energy and Petrol | Djerassem le Bémadjiel | Minister of Energy | Governmental official | 27/01/15 |
| | | Secretary General | Governmental official | 21/01/15 |
| | | Director General, Energy | Governmental official | 21/01/15 |
| | | Director of Renewable Energy | Governmental official, Training beneficiary | 21/01/15 |
| Association pour le Developpement des Energies Renouvables (ADER) | Jean-Paul M'Batna Limatna Arthur Houssadi | General Co-ordinator General Administrator | Governmental official, training beneficiary | 22/01/15 |
| Groupe Performance Consulting (GPC) | Cheikh Ahmat Sow | Project manager | Training beneficiary | 23/01/15 |
| Sylvanus | Tone-Yade Stephane Madjiallah | Lawyers? | Consultant for component 1 & 2 | 21/01/15 |
| | | | | 21/01/15 |
| Douguia Local Association, | Abicho Ahmat<br>Makaïla Mahamat<br>Djibrilla Alifa | Président<br>Technicien<br>Maintenancier | Representatives of beneficiaries of component 3 (electricity) | 22/01/15 |
| Mombou Local Association | Mbodou Issa<br>Moussa Abdoulaye<br>Kaltouma Ali<br>Mbodou Abdoulaye<br>Abdel kérim Haroun<br>Herta Issa | Président<br>Vice Président<br>Secrétaire<br>Contrôleur financier<br>Représentant Sages<br>Women representative | Representatives of beneficiaries of component 3 (electricity) | 23/01/15 |
| Mombou users | | School teacher<br>Water pump and welding owner,<br>Association leader | Beneficiary of component 3 (electricity) | 23/01/15 |
| Mombou management team | | Manager<br>Technician<br>Guard | Beneficiary of component 3 (electricity and training) | 24/01/15 |
| IDEB | Abakar ABDOULAYE | | TTA sub-contractor and training beneficiary | 24/01/15 |
| TTA | Marta Pascuel<br>Pablo Munoz | Local project coordinator<br>Engineer | UNIDO contractor for Component 3 | 25/01/15 |
| | Xavier Vallve | Project manager | | 11/02/15 (tel) |
| Guelendeng Maire | | Mayor | Future beneficiary and key consultee | 26/01/05 |
| UNDP | Moustafa x | Project coordinator | Donor | 27/01/15 |
| EU | Peter Marien<br>Christos Solmonides | Chef de unit<br>Attache | Donor | 27/01/15 |
| ECREEE | Eder Semedo | | UNIDO contractor for training | 30/01/15 (tel) |
| E3analytics | Toby Couture | Consultant | Consultant for Component 1 & 2 | 02/02/15 (tel) |

**Mission Programme (21st-27th January 2015)**

| | AM | | PM | | |
|---|---|---|---|---|---|
| 21st Jan | Secretary General, MPE | Director General, Energy Division | Director of Renewable Energy | Sylvanus | |
| 22nd Jan | ADER | Travel to Douguia | Douguia Local Association | | |
| 23rd Jan | GPC | Travel to Mombou | Mombou Local Association | Mombou users | |
| 24th Jan | Mombou management team | IPEB | Travel back | | |
| 25th Jan | | | TTA | | |
| 26th Jan | Travel to Guelendeng | Maire of Guelendeng | Travel back | | |
| 27th Jan | UNDP | Local co-ordinator | Minister of Energy | EU | UNIDO |

# B. List of documents reviewed

| Document title or description | Author | Date |
|---|---|---|
| **Project documents** | | |
| Promoting renewable energy based mini-grids for rural electrification and productive uses - PIF | UNIDO | 24/04/09 |
| Approved CEO Endorsement document | UNIDO | 02/2012 |
| Progress at 06/02/14 per project with revised deadlines component in excel | ? | 06/02/14 |
| Action plan April 2014 (note different activities) in excel | | 16/04/14 |
| Operational plan behind the action plan | Dangaye | |
| Monitoring action plan (undated) in word (same activities as above) | | undated |
| Revised Chad Budget Sept 2014 | UNIDO | Sept 14 |
| **Funding related documents** | | |
| Signed Trust Fund Agreement | | |
| Commitment letter from Government from January 2011 | MOE | 19/01/11 |
| Confirmation from the Secretary General about the fund commitment from April 2014 | MOE | 18/04/14 |
| UNIDO letter to Secretary General signed by MD from August 2014 | UNIDO | 13/08/14 |
| Agreement between UNIDO and MPE, Republic of Chad re. finance commitments | UNIDO/MPE | 15/08/12 |
| **Project progress documents** | | |
| Construction and commissioning of 5 solar photovoltaic mini grid in Chad on a turn-key basis: Inception mission report | TTA | 03/2012 |
| Powerpoint presentation of inception report | TTA | March 2012 |
| PIR June 2013 - 2014 | UNIDO | June 2014 |
| PIR June 2012 – June 2013 | UNIDO | June 2013 |
| 1st progress report - TTA | TTA | Dec 2013 |
| 2nd progress report - TTA | TTA | June 2014 |
| 3rd progress report - TTA | TTA | June 2014 |
| Back to office report (includes minutes of PSC and comments on design) | D Masera | 08/05/2013 |
| Back to Office report (includes discussions with communities) | M. Mattiat | April 2014 |
| Back to Office report | D. Masera<br>J. Imrichova | May 2014 |
| Minutes of 1st PSC meeting in April 2013 (as annex to above) | PSC | 19/04/2013 |
| TTA powerpoint presentation to PSC | TTA | April 2013 |
| Minutes of PSC Meeting 14/0913 | MPE | Sept 2014 |
| Minutes of May 2014 PSC meeting (as annex to above) | MPE | 10/05/14 |
| ERDET project bulletins 1 – 5 – December 2013 – December 2014 | TTA | Dec 2013-14 |

| Document title or description | Author | Date |
|---|---|---|
| Selection of emails between UNIDO HQ, PCU and TTA | various | various |
| Baseline questionnaire | | |
| Some photos | | |
| **TORs and Sub-contracts** | | |
| Purchase order for ECREEE HOMER training | UNIDO | 20/08/14 |
| Contract No. 16002596 between UNIDO and TTA for construction and commissioning on a turn-key basis of a solar PV mini-grid | UNIDO | 10/12/12 |
| Amendment No. 1 to Contract No. 16002596 between UNIDO and TTA | UNIDO | July 2013 |
| Amendment No. 2 to Contract No. 16002596 between UNIDO and TTA and invoice (includes changes to payment schedule) | UNIDO | Dec 2013 |
| Accord OUNDI – TTA 160414 (includes plans for proposing associations and tariffs to PSC and action points for construction and overground/underground cables) | UNIDO/TTA | 16/04/14 |
| Terms of Reference for construction and commissioning on a turn-key basis of a solar PV mini-grid (Annex F of above amendment) | UNIDO | |
| Contract No. 3000023053 between UNIDO and Sylvanus Bassounda | UNIDO | Sept 2014 |
| Terms of Reference for the legal/regulatory work | UNIDO | May 2014 |
| Terms of Reference for the Acquisition of Services in Organising a Homer Training Course in Tchad | UNIDO | |
| Schedule for visit by UNIDO for the pre-shipment inspection to TTA | TTA | Nov 2014 |
| TOR for international regulatory expert | UNIDO | |
| Arrete No. 1 / MPE/SG/DE/2011 – project co-ordinator | MPE | 13/01/11 |
| ToR for National Coordinator | UNIDO | 2013 |
| **Background documents** | | |
| Demand aupres du Clean Energy Centre for Chad – review of RE technologies, business models and costs for rural electrification in Chad | Toby Couture | 27/08/14 |
| National strategy for RE development | Ministry of mines, energy and water, Mali | |
| Schema Directeur due Secteur de L'Energie au Thcad (National Energy Sector Strategy) | Fichtner | Feb 2012 |
| Rural Electrification model for communities with less than 500 inhaitants in Senegal | GTZ | Jan 2006 |
| Financing mechanisms for rural electrification | | |
| Morocco's Renewable Energy Law no. 13-09 | | June 2010 |
| Chad law no 014/PR/99 related to the production, transport and distribution of electricity | | May 1999 |
| Renewable energy in Mali – resources, technologies and opportunities executive summary | | |
| Renewable energy in Sengal – resources, technologies and opportunities | Peracod | April 2011 |

| Document title or description | Author | Date |
|---|---|---|
| Chad economic figures | | |
| Presentation of proposed new xx electricity sector in Senegal | | |
| Action plan for new and renewable energy in Chad & executive summary (not yet validated) | UNDP | 2014? |
| Project co-ordination documents | | |
| 8 x Ordre de Mission | MPE | Various |
| 5 x Letters requesting visas | MPE | Various |
| Progress and mission reports from co-ordinator to Vienna –Nov, Jul, Jun, 2014, Jan 2015 | Dangaye | 2014 |
| Letters to Government re. Co-finance, procurement of TTA, | | |

# C.Evaluation Matrix

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| **A. PROJECT DESIGN**<br>**To what extent does the Project address the problem** | | | | |
| Intervention logic reflects program objectives at each level of Project planning and implementation | Was the project formulated based on a logical framework approach?<br>In each area of the work plan, are the identified activities, outputs, and products appropriate to the objectives of the Project?<br>Is the project design adequate to address the problem stated? | • Evidence of intervention logic and logical framework approach<br>• Extent to which Project objectives are reflected in planned activities and services | Desk review | Project documents |
| Assumptions and targets are realistic | a) Are the assumptions on which the Project strategy is based reflective of the operational realities on the ground?<br>(b) How have the assumptions been used to formulate planned activities?<br>(c) Has the Project strategy been formulated with targets that are (i) clearly defined, (ii) measurable and (iii) achievable, given the lifetime of the Project?<br>(d) Have any amendments to the assumptions or targets been made or planned during the Project's implementation? If so, (i) how were these carried out, (ii) for what purpose, and (iii) what were the consequences of these amendments? | • Extent to which assumptions are reflected in project documents and strategy<br>• Extent to which targets are deemed realistic by stakeholders | Document review<br>Interviews | Project documents<br>Stakeholders (project staff, govt, beneficiaries) |
| Risks identified at Project design are still adequate | a) Are the risks identified at Project design still adequate?<br>b) Have any new risks emerged? | • Extent to which identified risks are adequate | Desk review<br>Interviews | Project documents<br>Stakeholders |
| Program results are clear and measureable | Does the project have a clear thematically focused development objective with a set of verifiable indicators?<br>Are program results measureable? | • Number and type of performance measurement indicators for monitoring of implementation of strategy and intended results in planning documents | Desk review | Project documents/ results framework |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| | | • Level of reporting on performance measurement indicators for monitoring of implementation of strategy and intended results stated in planning documents | | |
| Level of stakeholder ownership in Project / Project addresses concerns of stakeholders | Is the Project addressing the needs of the target beneficiaries?<br>Was a participatory approach used to select the problem areas and national counterparts?<br>What is the relevance of the project's objectives, outcomes and outputs to different stakeholder groups? | • Level of involvement of government officials and other partners in the Project design process | Interviews | Government reps |
| | | • Degree of involvement and inclusiveness of stakeholders in Project design | Interviews | Other stakeholder groups (NGOs, entrepreneurs, utility) |
| | | • Strength of link between expected results and the needs of relevant target stakeholders | Interviews | Project partners, beneficiaries and other organizations |
| **B. RELEVANCE**<br>**To what extent does the Project relate to Chad environmental and energy policies and priorities and to global environmental benefits and the main objectives of GEF focal areas** | | | | |
| How does the Project support the GEF climate change focal area | Is the Project relevant to the GEF climate change focal area?<br>Are the project outcomes consistent with the focal area?<br>What is the likely nature and significance of the contribution of the project outcomes to the focal area? | • Existence of clear relationship between the Project objectives and the GEF climate change focal area | Desk review | Project documents<br>GEF focal area strategies and documents |
| Project addresses identified challenges in the Chad energy sector | Is the Project relevant to Chad environmental and energy policies and priorities (and regional and international agreements)?<br>a) What are the Project 'objectives', 'planned outputs', 'activities and inputs'?<br>(b) What are the local and national environmental priorities and policies, and expected global environmental benefits to be obtained?<br>(c) Are (a) formulated with relevance to (b)?<br><br>Are project outcomes contributing to national development priorities and plans? | • Coherence matrix showing Project objectives and identified national energy priorities, policies and strategies | Desk review | Project documents and reviews, national energy policies |
| | | • Perceptions of in-country stakeholders, including energy sector practitioners, CSOs, NGOs, communities, local government, as to whether Project responds to national priorities and existing capacities | Interviews | Project partners and other organizations, stakeholders |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| | Do (a) continue to be relevant in relation to (b) at the midterm point of the Project?<br>Is there a need to reformulate the project design and the project results framework given changes in the country and operational context? | • Evidence of adjustment of Project activities during implementation because of new information on challenges or concerns | Interviews | UNIDO staff and relevant peers and stakeholders |
| How does the project support UNIDO's thematic priorities | Is the project in line with UNIDO's mandate, objectives and outcomes defined in the Programme, Budget and core competencies? | • Existence of clear relationship between the Project objectives and the UNIDO's mandate, objectives and competencies | Desk review | Project documents<br>UNIDO documents |
| Level of stakeholder ownership in Project / Project addresses concerns of stakeholders | Is the Project addressing the needs of the target beneficiaries?<br>What is the relevance of the project's objectives, outcomes and outputs to different stakeholder groups?<br>Were the relevant vulnerable groups and powerful supporters and opponents of the processes properly involved?<br>Were perspectives of those who would be affected by project decisions, those who could affect the outcomes, and those who could contribute information or other resources to the process taken into account while taking decisions? | • Level of involvement of government officials and other partners in the Project design process | Interviews | Government reps |
| | | • Degree of involvement and inclusiveness of stakeholders in Project design | Interviews | Other stakeholder groups (utility, municipal govt etc) |
| | | • Strength of link between expected results and the needs of relevant target stakeholders | Interviews | Project partners, beneficiaries and other organizations |
| | | • Degree to which Government has maintained its financial commitment to the project (disbursement of promised co-finance) | Desk review<br>Interview | Project financial documents<br>Government reps |
| | | • Degree to which Government has approved policies or related regulatory frameworks in line with the project's objectives? | Desk review<br>Interview | Policy documents<br>Government reps |
| Is the Project relevant with respect to other donor supported activities | Does GEF funding support activities not addressed by other donors / How does it fill the gaps? | • Degree to which Project is coherent and complementary to other donor programming<br>• Is there co-ordination and complementarity between donors<br>• Other possible options to meet the same objectives. | Document review<br>Interviews | Documents from other donors<br>Other donor reps<br>Project documents |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| Project has a clear identity and niche | Project has a clear identity | • Perceived relative advantages of working with Project over other competitive options, according to clients and other stakeholders | Interviews | Project stakeholders |
| Any amendments still ensure Project on track to meet target | a) Were any amendments to Project design made during implementation to date?<br>(b) If so, why and with what consequences?<br>(c) Is the Project on track to meet its targets?<br>(d) What recommendations, if any, can be made based on the mid-term review to ensure the Project is on track to meet its targets? | • Number of amendments made to project design | Desk review<br>Interviews | Project management documents<br>UNIDO staff |
| **C. EFFECTIVENESS**<br>**To what extent have/will the expected outcomes and objectives of the Project been/be achieved?** | | | | |
| Progress towards Project objectives at mid-term | What ratings does the Project achieve in terms of implementation progress | • Indicators from Project framework (planned vs expected outputs, outcomes, impacts | Document review<br>Interviews | Project documents<br>Key stakeholders<br>Monitoring data |
| The Project has achieved its mid-term objectives | Has the Project been effective in achieving the expected outcomes and objectives?<br>If expected results at MTE are only outputs/inputs are there any real outcomes of the project and are these commensurate with realistic expectations of the project? | • Degree of achievement in meeting Project objectives as set out in the Project results framework (or modified framework)<br>• Program level of achievement (intended and unintended outputs, outcomes and impacts)<br>• Number of planned vs. implemented Projects/activities<br>• (see indicators in document) | Interviews<br>Desk review | Project management and relevant peers and stakeholders<br>Project documents and reviews, other relevant docs |
| Project has generated results that could lead to changes in the assisted institutions | Has the project been effective in generating results that could lead to changes in the assisted institutions? | • Degree to which there have been changes in target institutions as a result of project results | Interviews | Stakeholders (Government, associations) |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| Project delivers longer-term impacts | Are there any actual and/or potential longer-term impacts identifiable? | • Extent to which any actual and/or potential longer-term impacts are identifiable?<br>• How to report future impact findings | Interviews | Stakeholders (Government, associations) |
| Stakeholder inclusiveness and collaboration | a) Who are the targeted project stakeholders and partners?<br>b) To date, has Project implementation been inclusive of the relevant stakeholders and collaboration between different partners identified in the Project strategy?<br>c) What means have been employed to ensure inclusiveness? (give concrete examples)<br>d) Are there stakeholder groups that the Project strategy failed to identify? If so, (i) which ones and (ii) why? | • Extent to which the implementation of the Project has been inclusive of relevant stakeholders and collaboration between partners | Interviews | Stakeholders |
| Project delivers quality outputs | How is the quality of the project outputs perceived by project stakeholders? | • Assessment of quality from different stakeholder groups | Interviews<br>Desk review | Relevant stakeholders (grid beneficiaries, training, government, CSO)<br>Feedback forms |
| Catalytic or replication effects due to the project | Describe any catalytic or replication effects both within and outside the project.<br>If no effects, described the catalytic or replication actions that the project has carried out. | • Degree to which there have been any catalytic or replication effects within the project<br>• Degree to which there have been any catalytic or replication effects outside the project<br>• What catalytic and replication actions have been carried out? | Desk review<br>Interviews | Project documentation |
| Coordination with other projects | Was there coordination with other UNIDO or donors' projects and did synergy effects happen? | • Degree to which Project is coherent and complementary to other donor programming<br>• Is there co-ordination and complementarity between donors<br>• Did possible synergy effects happen? | Document review<br>Interviews | Documents from other donors<br>Other donor reps<br>Project documents |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| Donor visibility related to this Project | What evidence is there of the donors' visibility?<br>b) Is there other evidence of the donors' visibility that relates specifically to the assignment? | • Donor visible relating to this Project | Document review | media coverage, official notices and press releases, reports and publications referring to the assignment |
| Likelihood of meeting objectives and global environment objectives | a) Is the Project likely to meet its objectives and overall results by the end of the Program? If not, why?<br>b) What are the main barriers, if any, for the Project to achieve its objectives?<br>c) What is expectancy to achieve global environment objectives/development objectives? | • Indicators from Project framework | Document review<br>Interviews | Project documents<br>Key stakeholders<br>Monitoring data |
| | Are there any unanticipated results achieved or likely to be achieved? | • Number of unexpected results | Document review<br>Interviews | Project documents<br>Key stakeholders<br>Monitoring data |
| Outcome in absence of Project | What would be the outcome if the project did not take place? | • Perception of stakeholders of outcome in absence of project | Interviews | Stakeholders |
| How can the Project build on its successes and learn from its weaknesses in order to enhance the potential for impact of the initiative? | | • Lessons/future direction | Interviews | Project-selected staff, managers, stakeholders |
| What lessons can be drawn regarding the effectiveness for the remainder of the project | | • What lessons have been learned regarding achievement of outcomes<br>• What changes could have been made (if any) to the design to improve the achievement of the results | Interviews | Project-selected staff, managers, stakeholders |
| **D. EFFICIENCY**<br>**The extent to which results have been delivered with the least costly resources possible** | | | | |
| Project results achieved (outcomes and impacts) justify the input and investment | To what extent are the impacts and benefits arising from the Project commensurate with the level of effort and resources expended?<br>a) Have Project inputs been (a) of suitable quality and (b) available when required to allow the Project to achieve the expected results?<br>b) If not, in what instances? Why was this the case? How has this adversely affected the Project?<br>c) How the quality of the inputs is being monitored by the Projects, through which indicators? | • Overall disbursements and project expenditure (funding, time, other resources – compared to budgets) | Desk review | Project documents and reviews, other relevant docs |
| | | • Extent to which inputs from donor and UNIDO have been provided as planned<br>• Were they adequate to meet requirements? | Desk review<br>Interviews | Project documents<br>Project staff / consultants |
| | | • Extent to which level of co-financing has occurred compared to that | Desk review<br>Interviews | Project documents, deal flows |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| | | planned<br>• Was co-finance adequate to meet requirements? | | |
| | | • Timeline for implementation and completion of activities (compare to annual work plans and project team projections) | Interviews | Project-selected and relevant staff |
| | | | Desk review | Project documents and reviews, other relevant docs |
| | | • Extent to which inputs have been of suitable quality and available when required to allow the Project to achieve the expected results<br>• Inputs and services of UNIDO and consultants | Interviews | Project management staff and stakeholders |
| Operations are cost-effective relative to the outputs, and results achieved (outcomes and impacts), | Is the project cost effective?<br>Has the project used the least cost options? | • Perceptions as to cost-effectiveness of program | Interviews | Project program manager(s), |
| | | • Level of execution of program budget | Desk review | Project documents and reviews, other relevant docs |
| | | • Percentage of budget for management and operations (vs. other activities) | Desk review | Project documents and reviews, other relevant docs |
| | | • Leveraging effect on investment | Desk review | Project documents and reviews, other relevant docs |
| | | • How does the cost and time effectiveness compare with other similar projects | Desk review | Other UNIDO/GEF project evaluations |
| What lessons can be drawn regarding the efficiency for the remainder of the project | | • What lessons have been learned regarding achievement of outcomes<br>• What changes could have been made (if any) to the design to improve the efficiency of the project | Interviews | Project-selected staff, managers, stakeholders |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| **E. SUSTAINABILITY**<br>**The likely ability of an intervention to continue to deliver benefits for an extended period of time after completion** | | | | |
| Sustainability integrated into Project | Are sustainability issues integrated into the design and implementation of the Project? | • Evidence/quality of sustainability strategy<br>• Evidence/quality of steps taken to ensure sustainability | Document review<br>Interviews | Project documents, project management staff, beneficiaries |
| Financial sustainability | | • Evidence of likely commitments to support sectors beyond the end of the Project | Document review<br>Interviews | Project documents, project management staff, beneficiaries |
| Sustainability of impact | How sustainable will the project impact be beyond the project implementation? | • Extent to which project is likely to be sustainable beyond the project | Interviews | Beneficiaries, stakeholders |
| Project is effective in developing internal and external partnerships to achieve objectives | How effective is the Project in building and developing internal and external partnerships to achieve its objectives? | • Resources (time, budget) spent on coordination with<br>- client country governments<br>- potential clients<br>- Project partners<br>- other stakeholders or recipients | Interviews | Project management, staff |
| | | | Desk review | Project documents and reviews, other relevant docs |
| | | • Evidence of local ownership | Interviews | Stakeholders |
| | | • Degree to which and nature of how external partners rely on Project to fulfil their country or local-level objectives | Interviews | Project partners and stakeholders, regional staff |
| | | | Desk review | Project documents and reviews, other relevant docs |
| | | • Number and quality of local partnerships developed through Project | Interviews | Project partners and stakeholders, regional staff |
| | | | Desk review | Project documents other relevant docs |
| | | • Perceptions of clients, partners, and other stakeholders as to tangible development results stemming from Project activities/involvement in the energy sector of their country/region and, their ranking | Interviews | Stakeholders |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| Project has learned internally from its experiences | To what extent has the program learned from its experiences?<br>a) Are there lessons to be learnt from implementation that should inform the next phase of the Project's implementation?<br>b) If not, are there lessons that are likely to emerge?<br>c) In what ways may these inform the Project's next phase?<br>d) Have steps been taken to ensure that benefits from (i) Project activities and implementation as a whole and (ii) lessons learnt from other programs, are integrated and applied to the Program as a whole?<br>e) Were formal strategic planning and knowledge management systems designed and put in place? Have these processes been followed? With what results? | • Project internal communication and feedback loops generating information useable in decision making | Desk review | Project documents and reviews, |
| | | | Interviews | Project and staff, management |
| | | • Examples of incidences whereby Project:<br>- took advantage of a positive model/solution and expanded on it<br>- avoided worsening a situation/set of activities, based on new understanding/information | Desk review | Project documents and reviews, |
| | | | Interviews | Project staff |
| Effectiveness of communication of lessons learned | How effective has the communication of lessons learnt to stakeholders been?<br><br>a) Have any lessons learnt during the Project's implementation to date been communicated to (i) the relevant Project stakeholders, and (ii) other related programs and Projects?<br>b) Who have any lessons learnt been communicated to and by what means?<br>c) Have lessons and format been appropriate for their audience?<br>d) Have lessons learnt effectively reached their intended audience | • Extent to which lessons learnt have been communicated to project stakeholders and other related programs and projects | Interviews<br>Document review | Project documents, project management, stakeholders |
| Project-initiated activities can spread to a wider set of beneficiaries | To what extent can project-initiated activities be broadened to a wider and larger beneficiary group, and be leveraged to bring about even more benefits than originally intended ? | • Amount of resources (time, budget, human resources) devoted to developing stronger links between Project activities and local beneficiary groups | Desk review | |
| | | | Interviews | Projects, staff and clients, stakeholders, and partners |
| | | • Evidence of stakeholder interest and capacity to identify ways to broaden the beneficiary group | Interviews | Project clients, partners, and stakeholders |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| | | | Desk review | Project documents and reviews, other relevant docs |
| Project activities that achieve objectives are replicable | Which activities are most effective in contributing to stated objectives, what are the characteristics of these activities, and to what extent have they been replicated, or could they be replicated, beyond this project? | • Replication of activities with high levels of achievement toward objectives in other countries/interventions | Desk review | Project documents and reviews, other relevant docs |
| | | | Interviews | Project management and relevant peers and stakeholders |
| | | • Perceptions of clients and other partners s to the effectiveness of those activities that were replicated from previous interventions | Interviews | Project management and relevant peers and stakeholders |
| Delays that may affect project outcomes and sustainability | If there were any delays in project implementation have they affected the project outcomes and /or sustainability and, if so, in what ways and through what causal linkages? | • Number and severity of delays in implementation<br>• Perception that delays will affect outcomes and sustainability? | Desk review<br>Interviewees | Project management, consultants, Government |
| Financial risks to achievement of sustainability | Are there any financial risks that may jeopardize sustainability of project outcomes?<br>What is the likelihood of financial and economic resources not being available once GEF assistance ends? (Such resources can be from multiple sources, such as the public and private sectors or income-generating activities; these can also include trends that indicate the likelihood that, in future, there will be adequate financial resources for sustaining project outcomes.)<br>Was the project successful in identifying and leveraging co-financing?<br>Has the committed co-financing materialized? How will this affect project outcomes, and if so, in what ways and through what causal linkages? | • Extent to which financial risks are identified and may affect outcomes<br>• Likelihood of further resources being available beyond the project<br>• Quantity of co-finance leveraged.<br>• Quantity of co-finance materialised compared to promises.<br>• Effect of lack of co-finance on project outcomes and sustainability. | Project documents / PIR<br>Interviews | Project management, consultants, Government |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| Socio-political risks to achievement of sustainability | Are there any social or political risks that may jeopardize sustainability of project outcomes?<br>What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained?<br>Do the various key stakeholders see that it is in their interest that project benefits continue to flow?<br>Is there sufficient public/stakeholder awareness in support of the project's long-term objectives? | • Extent to which social or political risks are identified and may affect outcomes<br>• Perception of stakeholders of future benefits and likelihood of involvement<br>• Perception of stakeholders of the long term objectives. | Project documents/PIR<br>Interviews | Project staff, beneficiaries, Government, consultants |
| Institutional framework and governance risks to achievement of sustainability | Do the legal frameworks, policies, and governance structures and processes within which the project operates pose risks that may jeopardize sustainability of project benefits?<br>Are requisite systems for accountability and transparency, and required technical know-how, in place? | • Extent to which institutional and governance risks are identified and may affect outcomes<br>• Evidence of a risk management system<br>• Quality of risk mitigation strategy developed and followed<br>• | Project documents/PIR<br>Interviews | Project staff, beneficiaries, Government, consultants |
| Environmental risks to achievement of sustainability | Are there any environmental risks that may jeopardize sustainability of project outcomes?<br>Are there any environmental factors, positive or negative, that can influence the future flow of project benefits?<br>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?<br>The evaluation should assess whether certain activities will pose a threat to the sustainability of the project outcomes. | • Extent to which environmental risks are identified and may affect outcomes<br>• Extent to which project outputs/outcomes affect environment which may affect future benefits | Project documents/PIR<br>Interviews | Project staff, beneficiaries, Government, consultants |
| **F. ASSESSMENT OF MONITORING AND EVALUATION SYSTEMS**<br>**The likely ability of an intervention to continue to deliver benefits for an extended period of time after completion** | | | | |
| Project has a functional M&E system | To what extent does the project have an effective monitoring, reporting and evaluation framework including measurable indicators, systematic and regular processes for collecting data, and feedback processes to facilitate decision making and learning? | • Project evaluation framework including indicators:<br>- at the activity level<br>- measurable (achievable, reportable, timely, specific) | Desk review<br>Interviews | Project documents, PSC minutes, work plans and reviews, other relevant docs<br>Project-selected |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| | Does project M&E meet the minimum requirements for application of the Project M&E plan? | | | management and staff |
| | | • Existence of a Project M&E system, including relevant processes and mechanisms for:<br>- monitoring<br>- reporting<br>- data collection & management<br>- feedback and learning | Desk review | Project documents, PSC minutes, work plans and reviews, other relevant docs |
| | | | Interviews | Project-selected managers and staff |
| Project's M&E system is used for feedback, adaptive management, training and learning | | • Internal learning achieved from the use of the M&E system by relevant individuals and ways they have learned | Desk review | Project documents, PSC minutes, work plans and reviews, other relevant docs |
| | | | Interviews | Project-selected staff, managers |
| | | • Actual use of the M&E system to change or improve decision-making/adaptive management | Interviews | Project-selected staff, managers |
| Project's M&E system enables accountability as a part of regular programming and strategy | Was M&E sufficiently budgeted for at the design state and whether M&E has been adequately funded and in a timely manner during implantation? | • Percentage of budget planned and spent on M&E systems | Desk review | Project documents and reviews, other relevant docs |
| | | • Evidence of use of M&E/reporting information to<br>- make management decisions/adaptive management<br>- inform strategy<br>- inform programming or planning<br>- other | Interviews | Project-selected management, including former Project program managers |
| | | • Frequency of reporting, updating, or use of M&E systems for accountability purposes | Interviews | Project-selected management, including former Project directors, |
| **G. MONITORING OF LONG TERM CHANGES**<br>**The likely ability of an intervention to continue to deliver benefits for an extended period of time after completion** | | | | |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| Project has a long-term monitoring system | To what extent has this project contributed to the establishment of a long-term monitoring system?<br>If not, should the project have included such a component?<br>How sustainable is the system and what is the likelihood that it continues operating beyond project completion? | • Existence of a long-term M&E system, including relevant processes and mechanisms for:<br>- monitoring<br>- reporting<br>- data collection & management<br>- feedback and learning<br>• How is the information generated used? | Desk review<br>Interviews | Project documents and reviews, other relevant docs<br>Project-selected managers and staff |
| | | • Is the system embedded in a stable institutional framework with associated financing? | Interviews | Project-selected management and staff |
| **H. ASSESSMENT OF PROCESSES AFFECTING ACHEIVEMENT OF PROJECT RESULTS (included in other sections where relevant)** | | | | |
| **I. PROJECT CO-ORDINATION AND MANAGEMENT** | | | | |
| Project was well prepared and ready to implement at start of project | Were the project's objectives and components clear, practicable and feasible within the timeframe?<br>Were lessons from other relevant projects properly incorporated into the design?<br>Were the capacities of executing institution and counterparts properly considered when the project was designed? | • Evidence of clear objectives and activities that were feasible within timeframe<br>• Evidence of lessons learned being incorporated into the project design<br>• Perception of gap between assumptions and reality of capacity of counterparts in project design | Desk Review<br>Interviews | Project documents<br>Project staff |
| | Were counterpart resources (funding, staff and facilities) and adequate project management arrangements in place at project start?<br>Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project approval? | • Evidence that counterpart resources were in place at project start<br>• Time taken to establish project management unit<br>• Evidence that roles and responsibilities were agreed prior to approval and were clear at project start | Desk Review<br>Interviews | Project documents<br>Project staff |
| Project's management | How appropriate and effective are Project's management structure and staffing profile in realizing a relevant, | • Evidence of clear roles and | Interviews | Project-selected management |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| structure is conducive to its objectives / Project's core management structure is effective and efficient | effective, and efficient Project?<br>What changes, if any, are needed to Project's organizational structure and staffing profile to carry out its mandate? | responsibilities for operational and management structure<br>• Degree of fulfilment of goals according to results framework (over evaluation period) | Desk review | Project documents and reviews, other relevant docs |
| | | • Degree to which UNIDO HQ co-ordination, monitoring, quality control and technical inputs have been efficient, timely and effective.<br>• Timeliness of identifying problems, quality support, field visits, staffing etc.) | Interviews | Project-selected management, including former Project managers, |
| | | • Relationship between organizational structure and fulfilment of project objectives<br>- formation or dissolution of teams or work plans in order to fulfil or drop specific business plan objectives<br>- number of staff and time spent on administrative tasks<br>- number of staff and time spent on knowledge or information/database management<br>- evidence of bottlenecks or barriers to decision-making (e.g., accessibility of senior staff/managers, ease of resource management systems) | Interviews | Project-selected management, including former Project program managers, |
| | | | Desk review | Project documents and reviews, other relevant docs |
| | | • Client/Stakeholder satisfaction with Project staff:<br>- performance in reaching mutual goals/objectives<br>- receptiveness/accessibility<br>- abilities/capabilities/skills<br>- expertise/applicable knowledge<br>- efficiency and timeliness<br>- other factors | Interviews | Project partners and stakeholders |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| | | • Perceptions of or actual levels of relative effectiveness and/or efficiency of Project's structure compared to other relevant energy sector trust funds/operational entities | Interviews | Project-selected management, including former Project program managers, partners |
| | | | Desk review | Project documents and reviews, other relevant docs |
| Project management exhibits flexibility in reaching Project objectives | To what extent does the Project management have the flexibility to design and effectively execute the activities to achieve Project goals? A) Has the Project team made use of results based management/ adaptive management processes during implementation?<br>b) Has there been evidence of flexibility in Project management?<br>c) Have any changes been made in response to the results based management/ adaptive management processes?<br>d) If so, (a) which changes were made, (b) for what purpose, and (c) with what results? | • Examples of changes made in approach or strategy by management after learning new information | Interviews | Project management and relevant peers and stakeholders |
| | | | Desk review | Project documents and reviews, other relevant docs |
| Project management identifies and manages key risks to fulfilling its mandate /<br>How is risk and risk mitigation being managed | How has the Project identified and managed risks?<br>a) What is the Project's Risk Mitigation strategy?<br>b) To date, has the Project's Risk Management strategy been effective in mitigating implementation challenges encountered?<br>c) What challenges, if any, have arisen during implementation? (i) what risks are compromising (ii) which specific results?<br>d) If so, how did the Project's Risk Management strategy assist to mitigate emerging problem(s)? If not, why not? | • Evidence of a risk management strategy<br>• Quality of risk mitigation strategy developed and followed<br>• Quality of existing information systems in place to identify emerging risks and other issues<br>• Mechanisms and means for UNIDO staff managing Project Projects to identify and bring forward risks<br>• Clients have means and mechanisms to report risks to mgt<br>• Mechanisms and means for Project staff to mitigate identified risks | Desk review<br>Interviews | Project documents<br>Project team |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| Project has appropriate financial controls, including reporting and planning allowing for informed decisions | Does the project have appropriate financial controls, including reporting and planning?<br>Do these controls allow for management to make informed decisions regarding the budget and allowed for timely flow of funds?<br>Is there due diligence in the management of funds and financial audits? | • Number and type of mechanisms of systems in place for reporting, planning and feeding back on financial and budgetary issues<br>• Examples of incidents where management has made financial decisions based on feedback from reporting.<br>• Examples of due-diligence carried out on funds and financial audits | Desk review<br>Interviews | Project documents<br>Project team |
| Co-financing materialises | Did promised co-finance materialise? | • How much co-finance has been provided compared to what was foreseen?<br>• What are the reasons? | Desk review<br>Interviews | Project documents<br>Project team<br>Government |
| UNIDO's supervision and backstopping is appropriate | Did UNIDO staff identify problems in a timely fashion and accurately estimate their seriousness?<br>Did UNIDO staff provide quality support and advice to the project, approve modifications in time, and restructure the project when needed?<br>Did UNIDO provide the right staffing levels, continuity, skill mix, and frequency of field visits for the project? | • Evidence of problems identified in timely fashion<br>• Perception of quality of support provided by UNIDO<br>• Perception of staffing levels and skills provided to project | Interviews | Project team, consultants, government |
| Project follows appropriate implementation approach | Is the implementation approach chosen different from other implementation approaches applied by UNIDO and other agencies?<br>Does the approach comply with the principles of the Paris Declaration?<br>Does the approach promote local ownership and capacity building?<br>Does the approach involve significant risks? | • Extent to which approach is the same as other UNIDO projects or other agencies.<br>• Perception of local ownership and capacity building<br>• Perception of risks to approach | Interviews | UNIDO staff/ consultants / beneficiaries |
| Project has an appropriate management accountability | How effectively has Project management accountability been exercised, and how well is M&E built into programming and strategy to strengthen accountability? | • Number and type of mechanisms or systems in place for holding Project management accountable for their roles and responsibilities | Interviews | Project-selected management |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| system | | • Examples of incidents when accountability measures or systems revealed mismanagement | Interviews | Project-selected management, staff |
| | | • | | |
| **J. ASSESSMENT OF GENDER MAINSTREAMING**<br>**The extent to which gender mainstreaming has been incorporated in the project** | | | | |
| Socio-economic benefits of the project included consideration of gender dimensions | To what extent have socio-economic benefits of the project included consideration of gender dimensions? | • Extent to which gender was considered during design of the pilot mini-grids (eg. selection of beneficiaries)<br>• Gender balance in beneficiaries<br>• Perceptions of gender balance | Interviews<br>Desk review | Project-selected management,<br>Project documents and reviews, other relevant docs |
| **K. PROCUREMENT ISSUES**<br>**T** | | | | |
| | - To what extent does the process provide adequate treatment to different types of procurement (e.g. by value, by category, by exception…)<br>- Was the procurement timely? How long the procurement process takes (e.g. by value, by category, by exception…)<br>- Did the good/item(s) arrive as planned or scheduled? If no, how long were the times gained or delays. If delay, what was the reason(s)?<br>- Were the procured good(s) acquired at a reasonable price?<br>- To what extent were the procured goods of the expected/needed quality and quantity?<br>- Were the transportation costs reasonable and within budget. If no, pleased elaborate.<br>- Was the freight forwarding timely and within budget? If no, pleased elaborate.<br>- Who was responsible for the customs clearance? UNIDO FO? UNDP? Government? Other?<br>- Was the customs clearance handled professionally and in a timely manner? How many days | • | Interviews | Consultants and UNIDO staff |

| Judgment Criteria | Evaluation Questions | Indicator(s) proposed | Means of verification | Source of verification |
|---|---|---|---|---|
| | did it take?<br>- How long time did it take to get approval from the government on import duty exemption?<br>- Which were the main bottlenecks / issues in the procurement process?<br>- Which good practices have been identified?<br>- To what extent roles and responsibilities of the different stakeholders in the different procurement stages are established, adequate and clear?<br>- To what extent there is an adequate segregation of duties across the procurement process and between the different roles and stakeholders? | | | |

# D.Overall Ratings Table

| Criterion | Reviewer's Summary Comments | Reviewer's Rating |
|---|---|---|
| **Attainment of project objectives and results (overall rating)** **Sub criteria (below)** | | **S / MS** |
| Effectiveness | At the "mid-term" the project is on the right track and has made progress towards outputs and outcomes but is significantly behind schedule. There is a significant risk that the project will not meet its overall development objectives due to a lack of co-finance. | S / MS |
| Relevance | The project is still highly relevant to the country context and addresses real needs. No shortcomings | HS |
| Efficiency | Appropriate balance between impact and resources has been achieved although behind schedule. | S |
| **Sustainability of Project outcomes (overall rating)** **Sub criteria (below)** | | **MU** |
| Financial risks | Significant risks related to the revenues at the demonstration sites and the lack of economies of scale for profitable O&M linked to no government commitment to replicate the model yet. | MU |
| Sociopolitical risks | Stakeholder ownership good but greater awareness of benefits is missing. | ML |
| Institutional framework and governance risks | Institutional framework being developed but still a risk related to lack of capacity. | ML |
| Environmental risks | No significant risks identified | L |
| **Monitoring and Evaluation (overall rating)** **Sub criteria (below)** | | **MS** |
| M&E Design | M&E at design did not include a "concrete and fully budget plan" with SMART indicators for all results and was not in line with GEF Minimum Requirements for M&E. | U |
| M&E Plan Implementation (use for adaptive management) | Although there is regular ad-hoc reporting and monitoring it does not include monitoring against the project results framework or SMART indicators. | MS |
| Budgeting and Funding for M&E activities | Sufficient budget was allocated but there is not clarity on its expenditure and some inconsistencies. | S |
| **UNIDO specific ratings** | | **S** |
| **Quality at entry / Preparation and readiness** | The project was not well prepared and ready to implement at the start of the project in June 2012. In particular there was a lack of consistency and detail in the design of the activities so it would have been difficult to procure services against the level of detail provided in the RCE. | MU |
| **Implementation approach** | Project management has been appropriate and for the most part effective and efficient. | S |
| **UNIDO Supervision and backstopping** | UNIDO's supervision and backstopping of the project has been satisfactory. UNIDO staff have provided suitable support and, as detailed earlier, have re-designed elements of the project when needed. UNIDO staff have been available when needed and, when required, any significant issues raised are resolved through headquarters rather than at a local level. | S |
| **Overall Rating** | | **MS** |

# E. Project design analysis

This Annex provides additional details on the project design analysis undertaken as part of the MTR:

- Review of the project results framework, including specific comments on Outcome-level and Output-level indicators (Table 17, , Table 18, Table 19 and Table 20) as well as comments on the original risks identified in the RCE (Table 21).

**Specific comments on the project results framework**

An assessment of the program's results framework is presented below analyzing the relevance of outputs, the definitions of indicators, and whether – in the Reviewer's opinion – they are appropriate.

**Table 17: Review of the relevance of planned activities for addressing the barriers**

| **Original Component Activities / Outputs (in CEO Endorsement)** | **Revised Component Activities / Outputs (in Workplan and Monitoring plan)** | **Comment on the relevance for addressing barriers** |
|---|---|---|
| **Component 1: Institutional, financial, policy and regulatory framework** | | |
| **Activity C1.1:** Review existing work and prepare energy policy framework to increase the share of RE and promoting the participation of private sector | Too vague - More specific activities agreed in workplan – see below | **Highly relevant.** There is a clear need for support for the development of a strategic framework for RE which is shown by requests from MPE for assistance, particularly with an electricity code and framework. |
| | **1.1** Review regulatory framework to establish a institutional and regulatory strategic framework for the promotion of RE | |
| | **1.2** Support the development of an Electricity Code for Chad | **Highly relevant.** See above |
| | **1.3** Validation and adoption of the proposed strategic framework for RE | **Highly relevant.** Consultation with the Government is extremely important to ensure country buy-in, sustainability and that the resulting recommendations will be adopted. Validation workshops to also include the private sector |
| **Activity C1.2:** Consultative and awareness building workshops to ensure that main actors of the energy sector and RE subsector understand their role and act in an effective manner for the promotion of a RE market | *See activities in components 1.3 and 2* | **Highly relevant.** Awareness building and consultation is important to ensure stakeholder buy-in and the ability to implement any recommendations. Part of this activity is now in 1.3 above and part is in Component 2. It has been split to better focus the training and consultation workshops. |
| **Activity C1.3:** Awareness and capacity building workshops for local financial service providers | | **Less relevant.** To increase financing for RE projects it is important that the local banks and loan officers understand the benefits of RE projects, can appraise them and can |

| Original Component Activities / Outputs (in CEO Endorsement) | Revised Component Activities / Outputs (in Workplan and Monitoring plan) | Comment on the relevance for addressing barriers |
|---|---|---|
| | | market RE loans. However the market is not developed sufficiently that this should be a key activity/output. No longer included in project activities. |
| **Activity C1.4.1:** Evaluation of existing investment environment and formulation of investment incentives and financial instruments<br>**Activity C1.4.2:** Awareness and capacity building workshops for public officers, project developers, equipment suppliers etc. on RE investment opportunities in facilities providing access to energy | *See activities in component 2* | |
| **Component 2: Assist private developers with feasibility studies** | | |
| **Activity C2.1:** Identifying and prioritising RE projects, its potential, economic viability of its exploitation and end users | | **Relevant.** Although overall relevant this activity was not sufficiently clear or focused and was not clear how it differentiated with C2.2. This has been incorporated into 2.1 and 2.2. below where relevant. |
| **Activity C2.2:** Preparing detailed feasibility studies for the installation of viable RE systems by investors and prioritising them following a pre-defined set of criteria focusing on productive uses and economic development | | **Highly relevant:** Due to a lack of expertise in Chad there was a need to assist in the development of detailed feasibility studies at selected sites. As initially designed it is still relevant to focus on productive uses and economic development. The activity has changed to omit the private investors since the original assumptions regarding private sector interest were overly ambitious. These initial projects will be capital funded with grants and Government support. |
| | **2.1** Identify and prepare feasibility studies for a number of economically viable RE systems prioritised for productive use. | |
| | **2.2:** Capacity building for public sector actors to design, promote and manage RE projects and establishment of public-private partnerships | **Highly relevant.** There is a real need to increase the capacity of institutional actors to ensure that they can develop relevant RE promotional policy, can design and manage RE projects and can discuss and form public/private partnerships. |
| | Establish a planning department within MPE | **Highly relevant.** Having a dedicated department within the Ministry provides focus and funds for RE. |
| | Training workshops for energy planning, design, monitoring and evaluation | **Highly relevant.** There is lack of knowledge about RE so a clear need for training. Stakeholders specifically requested further training on planning and practice. |
| | Training on databases, KOMFAR, HOMER etc. | **Highly relevant.** There is lack of knowledge about RE so a clear need for training. Software training is important to |

| Original Component Activities / Outputs (in CEO Endorsement) | Revised Component Activities / Outputs (in Workplan and Monitoring plan) | Comment on the relevance for addressing barriers |
|---|---|---|
| | | enable stakeholders to design and plan for projects. It is important that each of the proposed training sessions is relevant. |
| | Identify barriers to private sector entry to RE and develop recommendations to address them | **Relevant –** although the private sector is not well developed it is still necessary to understand the drivers and barriers to design approaches to address them. |
| | Develop concept bankable RE projects | **Less relevant -** it is difficult to identify truly bankable RE mini-grid projects so this is over-optimistic. |
| | Identify and map current state of private sector investment and key stakeholders. | **Relevant –** to understand the potential actors in the sector it is useful to map them to help understand their drivers. |
| | Organise meetings between public and private sector actors to discuss RE project investment | **Very relevant –** To get private public partnerships off the ground it is important that the two groups meet one another and understand the real opportunities. |
| **Component 3: Technology demonstration and creation of awareness and technical capacities development** | | |
| **Activity C3.1.1:** Preparing technical / financial feasibility study for a selected site, BQ, and identifying the appropriate management modality for the energy production enterprise. | **3.1** Finalise feasibility studies<br><br>*See component 2.1* | **As above.** This activity and the one above have been combined into the one activity with a target of 4-5 project sites identified and detailed feasibility studies prepared for each. |
| **Activity C3.1.2:** Prepare and award a subcontract for the design, construction, installation and awareness raising of beneficiaries and other stakeholders | | *Included as project management activity – rather than project activity.* |
| **Activity C3.2:** Construction of pilot plants on selected sites completed. Including:<br>Civil work and equipment procurement (progress reports)<br>Installation of equipment, T&D lines, start-up testing and commissioning (progress report)<br>Training through on-the-job training on issues of construction, commissioning, O&M and management (progress reports)<br>Development manuals and handbooks for O&M and management<br>Preparing as-built documents and final report | Installation of pilot plants at selected sites (Douguia, Mombou & Guelendeng) including all activities mentioned under C3.2. | **Highly relevant.** There is a real need for examples RE based mini-grids in Chad rather than relying on 'foreign experience' to show that it is a viable option for electricity access, can encourage productive uses and can be economically viable and be managed and operated locally.<br>The revised workplan splits the work between Douguia and Mombou as one phase and Guelendeng as a second phase. |

| Original Component Activities / Outputs (in CEO Endorsement) | Revised Component Activities / Outputs (in Workplan and Monitoring plan) | Comment on the relevance for addressing barriers |
|---|---|---|
| | **3.2** Establish a community management model for mini-grids | **Highly relevant:** This activity has been added and is very relevant to ensure community or private sector operation and sustainability of the models. |
| **Activity C3.3:** Training of local authority officers and interested private sector service providers-to-be through on-job training on the issues related to O&M – final report | | **Highly relevant:** To ensure the sustainability of the mini-grids it is very important that local staff are trained. The activity has been changed to add management and also to omit the type of service provider (eg. private) so that the activity focuses on the appropriate local operator (whether public, private or community). |
| | **3.5** Training a local operator and technician team for O&M and management | |
| **Activity C3.4:** Identification of productive use opportunities in the areas to be served by the minigrids to be promoted for private partnership in linking with potential local investment opportunities | | **Highly relevant** to identify and promote productive uses for economic development and ensure viable mini-grids. Activity has been adapted appropriately to reduce the emphasis on the private investment. |
| | **3.6** Promotion of productive uses and development of RE value chains | |
| **Activity C3.5:** Holding stakeholders consultation and validation workshops | *See component 1.3* | **Relevant**. Aspects relating to the legal framework are now included in Component 1.3 but more general awareness raising is missing from the project. |

The Project Results Framework in the CEO document includes indicators for the outcomes but does not include any indicators for the activities or individual outputs except for the actual output and in many cases does not include targets against the stated indicators. The following tables include information from the Results Framework, the monitoring plan and PIR to highlight the changes. For each component the expected outcomes, objectively verifiable indicators, assumptions and comments from the Reviewer on their relevance and whether the assumptions underpinning them are/were appropriate are provided.

**Table 18: Comments on indicators for Component 1: Institutional, policy and financial mechanisms**

| | Original verifiable indicator / Target | Risks and Assumptions | Commentary from the Reviewer |
|---|---|---|---|
| **CEO Endorsement**<br>**Outcome**: An effective, market oriented policy and regulatory framework to stimulate investments in RE | Number of RE policy programs developed and validated | Sustained and solid Government support to the project<br>Poverty reduction and economic growth drives for securing the modern energy input to development grow progressively | This indicator could be appropriate but no targets for the number were provided and it is not clear if this relates to policies, laws or programmes |
| | Adoption of regulatory measures to support RE and market | | Again this could be appropriate but it needs to be clear what measures are |

| | Original verifiable indicator / Target | Risks and Assumptions | Commentary from the Reviewer |
|---|---|---|---|
| | transformation | stronger | to be adopted and how many. |
| | PV mini-grid systems information and dissemination seminars, education and outreach materials available | | This is not a real indicator nor does it refer to any actual activities of the project. No targets provided except unspecified best practice publications, case studies developed and outreach materials. |
| | Energy Institutional framework effective and role of main actors in promoting a RE market defined | | It is not clear what this refers to that is separate from the above outputs. However documentation of role of main actors would be useful and an appropriate indicator |
| | Local financial service providers aware and have expertise of analysis and evaluation of risks related to investments on RE. 10 FIs staff trained | | Appropriate target and indicator. At the same time, there is no indicator for how much their capacity will be built. |
| | Package of investment incentives, standardised PPAs, tariffs, pricing mechanisms, risk management instruments and viable PV based rural minigrid business models developed. | | This is too general not providing detail on what is actually likely to be delivered. It does not reflect the activities outlined and the targets provided only refer to a PPP financial mechanisms. |
| | | For all the above sources of verification should include MPE documentation, project documents, and the training material | |
| **PIR**<br>**Outcome 1.1**: An effective, market-oriented, policy and regulatory framework to stimulate investments in RE | Availability of strategic framework for RE | *(not provided)* | Target is strategic framework is ready for adoption. This is an appropriate indicator and target. |
| **Monitoring plan** | Strategic framework available as well as recommendations for | Political support for the project | Indicator appropriate and source of verification good. |

| | Original verifiable indicator / Target | Risks and Assumptions | Commentary from the Reviewer |
|---|---|---|---|
| | projet de loi. | Missing information on existing regulatory texts<br>Delays in identifying suitable expert | |
| | Recommendation for RE strategic framework including a review and comparison of other countries' frameworks. | | This indicator seems appropriate. |
| | Recommendations for elaborating Electricity Code | | This indicator seems appropriate. |
| | Recommendations are adopted by the national counterpart | | This indicator seems appropriate. And sources of verification appropriate |

**Table 19: Comments on indicators for Component 2: Assist project developers with feasibility studies**

| Source of indicator | Objectively verifiable indicator | Risks and assumptions | Commentary from the Reviewer |
|---|---|---|---|
| **CEO Endorsement document**<br>**Outcome** A portfolio of RE energy projects prepared for pilot PPP investments during and post GEF-project promoting PPP and productive uses | Project sites identified and its end-use evaluated | Counterpart coordinates and executes the project efficiently and effectively.<br>General security and stability in the country | Indicator should be "number of sites identified...". Target very high at 10. |
| | A portfolio of viable and bankable projects for the installation of PV mini-grids by private investors following PPP a pre-defined set of criteria | | The indicator could be appropriate but the target provided is not related and does not quantify figures but refers to no. of developers and investors. This indicator is therefore inconsistent and confused. |
| **PIR**<br>**Outcome 2.1**: A portfolio of RE projects prepared for pilot private sector investments during and post the GEF | Identification of number of project sites for installation of economically viable RE systems and prioritised for productive use. | *(not provided)* | Indicator is appropriate but described as an activity not an indicator. Should be " number of project sites identified..."<br>Appropriate target of 4-5 sites identified and feasibility studies carried out. |
| **Monitoring plan** | Public sector actors are capable of designing and managing RE projects and one private-public partnership is operational | Political will from MPE to increase their RE capacity<br>Political will to really work with the private sector | This is an appropriate indicator but it is not SMART – it cannot be measured. There is no indicator for how much their capacity will be built. |
| | Planning department established and | Lack of engagement from MPE to establish | Appropriate indicator. Sources of verification |

| Source of indicator | Objectively verifiable indicator | Risks and assumptions | Commentary from the Reviewer |
|---|---|---|---|
| | operational within MPE | a department and to make staff available<br>Lack of interest from public and private sector to attend training and to engage in partnership<br>The business environment does not attract private investment | appropriate. |
| | Public/private sector actors are capable of designing and management RE projects and software | | As above – it is not clear how the actors are deemed capable. Other sources of training material and minutes are appropriate. |
| | Barriers to development of RE projects are identified and recommendations developed for overcoming them. | | Appropriate. |

**Table 20: Comments on indicators for Component 3: Technology demonstration**

| Source of indicator | Objectively verifiable indicator | Risks and assumptions | Commentary from the Reviewer |
|---|---|---|---|
| **CEO Endorsement Outcome:** Reduced GHG emissions and increased access to rural electrification following increased awareness and technical capabilities of stakeholders to evaluated technical and commercial viability of PV based mini-grids and reduced barriers to development of businesses in RE | Number of small businesses and households using electricity as main source for lighting and productive uses. | Coherent community acceptance to the participative approach to developing and establishing mini-grids<br>Beneficiaries understand the benefits of the new approach<br>General security and stability in the country<br>Financing from all sources made on a timely basis in line with proposed activities and budget | An appropriate indicator but is insufficient; alone this does not provide the full picture of the activities – for example GHG emissions avoided (mentioned in outcome) are not included nor the size of the systems nor any mention of increased capacities.<br>Targets refer to 5 systems of about 50 kW but was not an indicator. Target figures are provided for total connections and total number of people. |
| **PIR Outcome 3.1:** Reduced GHG emissions and increased access to rural electrification | Incremental direct and indirect CO2 eq emission reductions (in CO2eq) | *(not provided)* | Appropriate indicator and targets |
| | Number of connections per site and number of households and small local businesses with access to electricity | | Appropriate indicator and targets but should include some disaggregation of targets between households and businesses. |
| | Trainings conducted for the local authority officers and interested | | Appropriate indicator and target of 8 – but really reflects activities in other components. |

| Source of indicator | Objectively verifiable indicator | Risks and assumptions | Commentary from the Reviewer |
|---|---|---|---|
| | private sector service providers | | |
| **Monitoring plan** | PV mini-grids are installed and operational at three sites | Lack of engagement from local community<br>Construction mistakes<br>Delays in equipment transport (customs, to site) | Although these are indicators appropriate on progress they are more appropriate as milestones in project management. They do not provide any indication of the size, the number of connections, the type of connection, the GHG emissions avoided – all indicators that would provide some information on whether the project has delivered on its outputs and towards its outcomes. |
| | PV mini-grids installed and operational at Douguia and Mombou | | |
| | Community business model for management of services established in Douguia and Mombou | | |
| | PV mini-grids installed and operational at Guelendeng | | |
| | Community business model for management of services established in Guelendeng | | |

**Risk identification**

Six significant risks were identified in the RCE document that might prevent the project objectives from being achieved. The table below shows the risk related to this component identified during the project design phase and comments on the appropriateness of the risks identified. Overall, the Reviewer believes that the risks were generally reasonably well-identified, but with a few risks not accounted for or the probability was underestimated.

**Table 21: Risks identified during project design and comments on their appropriateness**

| Risks | Mitigation approach in the project design | Comments regarding the appropriateness of the risks identified and mitigation approach | Included in risk management in PIR |
|---|---|---|---|
| **Institutional risk** | | | |
| Low government commitment to renewable energy and the GEF UNIDO project.<br>A risk could be that the propose Policies and Financial mechanisms are not enacted.<br>Low probability and high potential impact | The Ministry of Oil and Energy is fully committed to the project and the objectives are in line with its policies. The Directorate of Energy, the technical arm of the MoE will be responsible for the management and coordination of the project in cooperation with the project steering committee. Close coordination, regular communication and delegation of responsibility will ensure continuous active involvement of key policy/institutional counterparts.<br>It is also important that the enacted laws are followed by application decrees given that the enactment of laws is not sufficient to attract the private sector in rural electrification projects. | This risk was appropriately identified, and since the project start the Government commitment to renewable and rural electrification has remained high. Discussions with MPE, ADER confirmed this. | √ |
| *Failure of co-finance to materialise* | *Repeated meetings between UNIDO-HQ and Ministry of Petrol and Energy to advocate for a release of the outstanding cofinancing. So far this has not materialised, officially due to administrative procedures between the Treasury and Ministry of Petrol and Energy. Efforts will continue from UNIDO's side to pledge for a transfer of funds by the end of the year, otherwise a contingency plan will have to be prepared on the grounds of available funds.* | *Although included in subsequent PIRs the specific risk of the co-financing commitments not being made available was not identified at the project design stage. This is a significant risk and omission at project design. It is now included in the annual risk reporting in the PIR. The lack of co-finance as promised will have significant impacts on the project outputs and outcomes.* | √ |
| **Technical risks** | | | |
| The renewable energy based minigrids technologies are not technically viable and there are risks associated with | Execution of activities will be carried out with the support of international experts/companies with demonstrated and successful past experience. Only mature and proven renewable energy technologies are being proposed. With respect to the capacity building and enabling activities | Risk appropriately identified and suitable mitigation measures in place. To date there have been some technical problems at the site with respect to the underground distribution line. Despite suitable measures being followed there are still problems. | √ |

| Risks | Mitigation approach in the project design | Comments regarding the appropriateness of the risks identified and mitigation approach | Included in risk management in PIR |
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| limited experience.<br>Very low probability and high impact. | special attention will be given to further defining the existing baseline in order to develop effective on-job-training while establishing the demonstration sites and well targeted capacity building programmes. | Continued local training is also required to ensure sustainability. | |
| Operation and maintenance of the mini-grids<br>Given the low literacy rate and lack of specialized capacities among rural communities in Chad, maintenance issues can be considered a risk to the RE based mini-grids.<br>Low probability and high impact. | Building technical capacities among rural local authorities and communities is important to mitigate this risk. It is also an integral part of the turn key subcontract of establishing the mini grids. This will be done by providing basic technical training to selected groups and persons, at community and local authority levels, on issues related to operation, preventive and accident resulted maintenance, management of mini grid facility, as well as on the role and responsibility of the various stakeholders and the information and decision flow, etc. This is in addition to the regular training of the operators and maintenance team of the facility. | Risk appropriately identified to ensure sustainability. In line with proposed mitigation approach local capacity is being built up. This risk is not specifically reported in the PIR but is implied in the previous risk. This should be further expounded in future PIR reporting. | **X** |
| **Economic and Financial risks** | | | |
| Photovoltaic based mini-grids turn out not to be economically and/or financially viable in Chad's rural areas. | Focus on renewable energy for productive purposes where the energy generated is used to create values/ services for the communities, which use the income so generated to pay for the energy services received. In addition, PV is known for getting increasingly cost effective and requiring low maintenance | Risk appropriately identified and reported on in PIR. This is a real risk particularly with reducing oil costs (see below). | √ |
| Financial and credit constraints prevent enterprises from investing in RE.<br>The ability of companies to invest in renewable energy projects will impact the replication of the demonstration projects and the long term market for renewable energy. Access to finance in Chad is possible but at prohibitively | One of the key advantages to investing in renewable energy is the offset of fossil fuel – which is very expensive in Chad. As part of the project training activities life cycle analysis will be taught to show the life time benefits of renewable energy, particularly in a volatile fossil fuel market. Demonstrating these benefits is expected to lead to further investment in RE projects. Training will also be provided to local financial institutions so that they fully understand the risks and benefits of RE projects. | Although not a risk for the pilot projects (funded by GEF and government) this is a very real risk for future investment in RE and the on-going market for RE. The demonstration projects will show what is possible yet more needs to be done to incentivise the private sector. Currently the private sector in Chad is not in a position to invest significantly in this sector. This should be reported in PIR. | **X** |

| Risks | Mitigation approach in the project design | Comments regarding the appropriateness of the risks identified and mitigation approach | Included in risk management in PIR |
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| high interest rates. | | | |
| **Market risks** | | | |
| Increased investments in renewable energy based mini-grids do not provide high enough returns. Sector stakeholders do not participate/ engage actively in the project | During the project preparation the general response was of strong support and interest to participate in the project. A well-structured national dissemination campaign demonstrating the viability of the pilot projects and outlining the opportunities during project implementation combined with an active dialogue and involvement of associations at the national and local level during the whole project duration will ensure the desired stakeholder response to the project. In addition, mobilizing part of the investments from development partners which can provide concessionary financing terms, and focus on providing energy for productive uses, will contribute market penetration and creation efforts | This risk was appropriately identified and the mitigation measures are appropriate but have not been taking place. To mitigate this risk to further engagement and investment it is important that there is some dissemination campaign and that potential stakeholders are actively engaged with. | √ |
| **Fall in fossil fuel prices** The international price of oil may fall to a level where fossil fuel power generation will be more cost effective than renewables | Investment in renewable energy should always include assessment of externalities, which will place renewables on a comparative advantage to fossil fuels. The fundamentals of global oil prices indicate that in the long-term the price of oil is expected to grow again. | This risk was appropriately identified in that oil prices have fallen considerably, although the probability was incorrectly labelled as very low. The effect can already be seen at the pilot sites where take-up of the connections is reduced. Potential customers who already operate diesel run gen-sets are less inclined to change to solar. Fewer customers on the mini-grid affects its commercial sustainability with reduced revenues against fixed expenditure. This risk will also affect future project replication. This risk needs to be reported in PIR. | **X** |
| **Implementation risk** | | | |
| UNIDO has long-standing direct experience in the development and implementation of RE projects and it has a strong knowledge of the key variables that determine the success and the failure | UNIDO will mitigate this risk through detailed development of activities plans in close cooperation with in-country project partners, stakeholders and developers. Agreed and transparent modus operandi will be defined before the start of the project implementation. | This risk was not described so difficult to assess to what extent it was appropriate. The mitigation measures would be expected for any UNIDO project to ensure a successful implementation. Not necessary to report. | **X** |

| Risks | Mitigation approach in the project design | Comments regarding the appropriateness of the risks identified and mitigation approach | Included in risk management in PIR |
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| of project implementation. Very low probability and medium impact | | | |
| **Stability risk** | | | |
| **Impact of political environment and instability** Although there is a strong political commitment, a volatile political environment could make a come back and lead to potential policy and insecurity environment that may have a detrimental impact on project implementation and on PV based mini grids development. | The government commitment to political stability and development is strong indication of the very low probability of the return to volatile situations. The process is supported by the donors and the international community | This risk was appropriately identified but has not been reported on and mitigation is difficult for circumstances beyond the control of the stakeholders. Since the project start the influence of Boko Haram has increased and this creates a real risk to security and therefore affects the completion of the construction projects. This should be included in reporting to PIR. | **X** |
| **Not included at design** | | | |
| Failure to achieve outcomes after successful delivery of outputs (long-term sustainability) | This was not identified as a risk but is a risk in projects where the logic intervention is not clear. In this project the outcomes are closely related to the outputs so the risk would be very low. | | |
| Private sector interest not forthcoming | The project was designed with an assumption that the private sector was interested and had the capabilities to invest in RE. However this was over-optimistic of the state of the sector and has been a real risk to the delivery of some of the designed outputs involving the private sector. This should be reported in PIR included in the above risks. | | |

# F. Terms of reference for the MTR

See separate file.

# G. Proposed Revised Project Results Framework for GEF Project #3593

| Project Strategy | | Objectively verifiable indicators | | | | |
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| | | **Indicator (quantified and time-bound)** | **Baseline** | **Target** | **Source of verification** | **Risks and Assumptions** |
| **Objective of the project** | Avoid greenhouse gas emissions by promoting renewable energy technologies for mini-grid rural electrification in Chad | 1. Incremental direct and indirect $CO_2$ emission reduced (tonnes of $CO_2$eq)<br>2. No. of electricity connections on selected sites<br>3. No. selected local businesses and households with access to electricity on selected sites | No direct or indirect $CO_2$eq emission avoidance | Direct emission reductions: 2235 tCO2eq<br>Indirect emission reductions fro 19,500 to 24,700 tCO2eq.<br>Approx. 300 connections (hh and small businesses) | GEF project tracking tool<br>Project documents | |
| **Project Component 1 – Institutional, financial, policy and regulatory framework** | | | | | | |
| **OUTCOME 1.1** | An effective, market oriented policy and regulatory framework to stimulate investments in RE | Availability of strategic framework for RE | No strategic framework for RE | Validated strategic framework for RE | MPE and project documents<br>Signed minutes of validation meeting | Sustained and solid Government support to the project<br>Poverty reduction and economic growth drives for securing the modern energy input to development grow progressively stronger |
| **Output 1.1.** | Review of regulatory framework to establish a institutional and regulatory strategic framework for the promotion of RE | Review of international frameworks relevant to Chad | No review | Review of international frameworks relevant to Chad published | Project reports | Political support for the project<br>Missing information on existing regulatory texts<br>Delays in identifying suitable expert |
| | | Recommendations for specific strategic framework for RE in Chad | No clear strategies for RE in Chad | Clear strategic framework for RE in Chad | MPE documents | |
| **Output 1.2** | Support the development of an Electricity Code for | Recommendations for elaborating Electricity code | No clear electricity code for Chad | Recommendations on Electricity Code | Project and government documents | |

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| | Chad | | | | | |
| **Output 1.3** | Validation and adoption of the proposed strategic framework for RE | No of validation meetings<br>Adoption of RE strategic framework | No strategic framework or discussions | 3 validation meetings<br>Signed adoption of strategic framework | Meeting minutes<br>Project and government documents | |
| **Project Component 2 – Assist private developers with feasibility studies** | | | | | | |
| **OUTCOME 2.1** | A portfolio of RE projects prepared for pilot private sector investments during and post the GEF | Identification of number of project sites for installation of economically viable RE systems and prioritised for productive use. | | 4-5 project sites identified and detailed feasibility studies prepared | | Counterpart coordinates and executes the project efficiently and effectively.<br>General security and stability in the country |
| **Output 2.1.** | Identify and prepare feasibility studies for a number of economically viable RE systems prioritised for productive use | Number of finalised feasibility studies for economically viable PV- mini-grids with productive uses | No feasibility studies carried out | 5 detailed feasibility studies completed | Project documents – copies of feasibility studies | Targeted stakeholders show willingness for training.<br>Training programme successfully implemented<br>Private stakeholders will engage with project activities<br>Political will from MPE to increase their RE capacity<br>Political will to work with the private sector<br>Lack of engagement from MPE to establish a department and to make staff available<br>Lack of interest from public and private sector to attend training and to engage in partnership<br>The business environment does not |
| **Output 2.2** | Capacity building for public sector actors to design, promote and manage RE projects and establishment of public-private partnerships | No. training sessions (disaggregated by type – planning/ design / software) | No training in RE | X training sessions (y on planning, z on software) | Participant logs and evaluation forms<br>Copies of training material<br>Copies of manuals | |
| | | No. of public sector trainees | No trained public sector employees | X trained employees | | |
| | | No. of private sector trainees | No trained private sector employees | X trained private sector employees | | |
| | | % female trainees | No female trainees | X trained females | | |
| | | No. of public sector actors capable of designing, promoting and managing RE projects | No employees capable to design, promote or manage RE projects | X public sector employees able to design, promote and manage RE projects | | |
| | | Private-public partnership is operational | None in existence | One partnership is operational | | |

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| | | Establishment of a RE department in MPE | No department | Department established made up of x experts | | attract private investment |
| | | Number of meetings between private and public sector actors to discuss RE investment | No meetings | X meetings | Minutes of meetings | |
| | | Barriers to development of RE projects are identified and recommendations developer for overcoming them | No reports or analysis on barriers to private sector input into RE | Report on barriers to RE | Copy of project documents | |
| | | Identification and map of current state of private sector investment and key stakeholders | No mapping or identification | Map of private sector investments and key stakeholders interested in RE | Copy of the project documents and maps | |
| **Project Component 3 – Technology demonstration and creation of awareness and technical capacity development** | | | | | | |
| **OUTCOME 3.1** | Reduced GHG emissions and increased access to rural electrification | Incremental direct and indirect CO2 eq emission reductions (in CO2eq)<br>Number of connections per site and number of households and small local businesses with access to electricity<br>Trainings conducted for the local authority officers and interested private sector service providers | | Direct emissions reduction of approx. 2,235 tons CO2 eq; indirect emission reduction of 19,500-24,700 tons of CO2 eq over the period of 10 years<br>-Approx. 300 households and small businesses with access to electricity<br>- 8 training delivered | | Coherent community acceptance to the participative approach to developing and establishing mini-grids<br>Beneficiaries understand the benefits of the new approach<br>General security and stability in the country<br>Financing from all sources made on a timely basis in line with proposed activities and budget |

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| **Output 3.1** | 5 PV mini-grids installed and operational | Number of PV mini-grids installed and operational | No PV mini-grids installed | 5 PV mini-grids installed at:<br>Douguia<br>Mombou<br>Guelendeng<br>Dourbali<br>Mailao | Project documents | Construction mistakes<br>Delays in equipment transport (customs, to site) |
| | | Number of connections per site and number of households and institutions with access to electricity | No connections to mini-grids | 1250 connections<br>X households connected<br>Y institutions connected<br>(disaggregated by site) | Project documents | |
| | | Installed capacity of PV in PV mini-grids (MW) | 0 installed | Installed capacity of more than 157 kW<br>(disaggregated by site) | Project documents<br>Site visits | |
| | | Direct CO2 eq. emissions avoided | No emissions avoided | 2235 t $CO_2$ eq | Project documents | |
| | | Performance monitoring, evaluation reports and case studies on each GEF supported project | No dissemination material PV mini-grids in Chad | 2-4 case studies | Project documents | |
| **3.2** | Establish community management models for mini-grids | Number of community management models established<br>Number of Local Association established | No community management models in place.<br>No local associations for management established | 5 community managed local associations established and operating | Project reports, Association statues, Association meeting minutes | Lack of engagement from local community |
| | Development manuals and handbooks for O&M and management | Number of manuals and O&M handbooks | No manuals or O&M handbooks | Manuals and O&M handbook for each site (5) | Project documents | |
| | Preparing as-built documents and final report | Number of as-built documents and final report | No as-build documents | As built documents for each site (5)<br>and final report (1) | Project documents | |

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| **3.5** | Training a local operator and technician team for O&M and management | No. of local trainees | No local trainees in mini-grid O&M and management | X trained people at each project site (total of y) | Project reports<br>Training manuals<br>Evaluation forms<br>Participant list | Lack of engagement from local community |
| **3.6** | Promotion of productive uses and development of RE value chains | No. of businesses connected | Businesses use own diesel generation or have no electricity | X businesses connected (disaggregated by site) | Project reports | |
| **Other** | | | | | | |
| | Demonstration of the benefits of rural PV-mini-grids | No. of case studies | No case studies | 2-4 case studies | Copies of case studies | |
| | Dissemination and public awareness | No. of project bulletins | None | X project bulletins | Copies of bulletins | |