Document of

The World Bank

Report No: \_\_\_\_\_

Project paper

ON A

PROPOSED ADDITIONAL LOAN

IN THE AMOUNT OF SDR 14.2 MILLION

(US$22 MILLION EQUIVALENT)

and on a

proposed grant FROM THE

GLOBAL ENVIRONMENT FACILiTY TRUST FUND

in the amount of US$1,454,540

TO THE republic OF LIBERIA

FOR A

LIBERIA ELECTRICITY SYSTEM ENHANCEMENT PROJECT

December 3, 2011

Energy Unit

Sustainable Development Department

Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective \_\_\_\_\_\_\_\_\_\_\_\_\_)

|  |  |  |
| --- | --- | --- |
| Currency Unit | = | Liberian Dollar |
| LD72 | = | US$1 |
| US$ | = | SDR 1 |

FISCAL YEAR

|  |  |  |
| --- | --- | --- |
| July 1 | – | June 30 |

ABBREVIATIONS AND ACRONYMS

|  |  |
| --- | --- |
|  |  |
|  | |  |  | | --- | --- | | AfDB | African Development Bank | | AFREA | Africa Renewable Energy Access trust fund | | AWPB | Annual Work Plan and Budget | | BE | Bank Executed | | BMC | Bong Mining Company | | CAS | Country Assistance Strategy | | CFL | Compact Fluorescent Light | | CFO | Chief Financial Officer | | CLSG | Côte d’Ivoire, Liberia, Sierra Leone, and Guinea | | COUF | Crude Offshore Unloading Facility | | CST | Crude Storage Terminal | | DA | Designated Account | | EBIT | Earnings Before Interest and Tax | | EBITDA | Earnings Before Interest, Taxes, Depreciation and Amortization | | ECOWAS | Economic Community of West African States | | EIA | Environmental Impact Assessment | | EIB | European Investment Bank | | EIRR | Economic Internal Rate of Return | | EITI | Extractive Industries Transparency Initiative | | EPA | Environmental Protection Agency | | ERL | Emergency Recovery Loan | | ESIA | Environmental and Social Impact Assessment | | ESMF | Environmental and Social Management Framework | | ESMP | Environmental and Social Management Plan | | ESW | Economic and Sector Work | | FIRR | Financial Internal Rate of return | | FM | Financial Management | | GAC | General Audit Commission | | GEF | Global Environment Facility | | GEMAP | Governance and Economic Management Program | | GoL | Government of Liberia | | GoN | Government of Norway | | GPOBA | Global Partnership for Output Based Aid | | HFO | Heavy Fuel Oil | | HIPC | Heavily Indebted Poor Countries | | IDA | International Development Association | | IFC | International Finance Corporation | | IFMIS | Integrated Financial Management Information System | | IFR | Interim (unaudited) Financial Statements or Reports | | IPP | Independent Power Producer | | ISA | International Standards of Auditing | | JICA | Japan International Cooperation Agency | | kV | Kilo Volt | | LEC | Liberia Electricity Corporation | | LED | Light Emitting Diode | | LESEP | Liberia Electricity System Enhancement Project | | LV | Low Voltage | | MC | Management Contract | | MHI | Manitoba Hydro International | | MLME | Ministry of Lands, Mines and Energy | | MPEA | Ministry of Planning and Economic Affairs | | MV | Medium Voltage | | MW | Megawatt | | NEP | National Energy Policy | | NORAD | Norwegian Agency for Development Corporation | | NPV | Net Present Value | | ORAF | Operational Risk Assessment Framework | | PEMFAR | Public Expenditure Management and Financial Accountability Review | | PDO | Project Development Objective | | PFMA | Public Financial Management Act | | PFMU | Project Financial Management Unit | | PPC | Public Procurement and Concessions | | PPCA | Public Procurement and Concessions Act | | PPCC | Public Procurement and Concession Commission | | PV | Photovoltaic | | RAP | Resettlement Action Plan | | RE | Recipient Executed | | REFUND | Rural Energy Fund | | RPF | Resettlement Policy Framework | | RREA | Rural and Renewable Energy Agency | | SOEs | Statement of Expenditures | | SSMF | Sustainable Solar Market Facilitation | | SSMP | Sustainable Solar Market Packages | | TOR | Terms of Reference | | UNDP | United Nations Development Programme | | USAID | United States Agency for International Development | | WAPP | West African Power Pool | |

|  |  |  |
| --- | --- | --- |
| Vice President: |  | Obiageli K. Ezekwesili |
| Acting Country Director: |  | Sergiy V. Kulyk |
| Country Manager |  | Ohene Nyanin |
| Sector Manager: |  | Lucio Monari |
| Task Team Leader: |  | Fanny Missfeldt-Ringius |
| Program Assistant: |  | Raima Naomi Oyeneyin |

**COUNTRY**

**PROJECT NAME**

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**Liberia**

**Electricity System Enhancement Project**

**ADDITIONAL FINANCING Data SHEET**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Basic Information - Additional Financing (AF)** | | | | | | | | | | |
| Country Director: Sergiy Kulyk  Sector Manager: Lucio Monari  Sector Director: Jamal Saghir  Team Leader: Fanny Missfeldt-Ringius  Project ID: P129097  Expected Effectiveness: May 15, 2012  Lending Instrument: Emergency  Recovery Loan  Additional Financing Type: Expanded  activities | | | | Sectors: Power (100%)  Themes: Access to urban services and housing (100%)  Environmental category: B (partial assessment)  Expected Closing Date: December 31, 2014  Joint IFC: No  Joint Level: | | | | | | |
| **Basic Information - Original Project** | | | | | | | | | | |
| Project ID: P129097 | | | | | Environmental category: B (partial assessment) | | | | | |
| Project Name:Liberia Electricity System Enhancement Project | | | | | Expected Closing Date: June 16, 2014 | | | | | |
| Lending Instrument: Emergency Recovery Loan | | | | | Joint IFC:  Joint Level: | | | | | |
| **AF Project Financing Data** | | | | | | | | | | |
| [ ] Loan [X] Credit [ ] Grant [ ] Guarantee [ ] Other: | | | | | | | | | | |
| Proposed terms: | | | | | | | | | | |
| **AF Financing Plan (US$m)** | | | | | | | | | | |
| **Source** | | | | **Total Amount (US $m)** | | | | | | |
| **Total Project Cost:**  **Co-financing:**  GEF  JICA  NORAD  Borrower:  **Total Bank Financing:**  IDA  New  Recommitted | | | | **56.95**  **1.45**  **33.00**  **0.50**  **22.00**  **22.00**  **22.00**  **0.00** | | | | | | |
| **Client Information** | | | | | | | | | | |
| **Recipient:**  Ministry of Lands, Mines and Energy  P.O. Box 10-9024  Monrovia 10  Liberia 1000  + 231-27-214-009  [www.molme.gov.lr](http://www.molme.gov.lr)  **Responsible Agency:**  Liberia Electricity Corporation (LEC)  P.O. Box 165  Waterside, Monrovia, Liberia 1000  Tel: +231 880719963  smohammad@mhi.mb.ca  Rural and Renewable Energy Agency (RREA)  P.O. Box 1280  LEC Sub-Station  Newport Street, Monrovia, Liberia  Tel: +231-76-309-880  [gusgoanue@yahoo.com](mailto:gusgoanue@yahoo.com) | | | | | | | | | | |
| **AF Estimated Disbursements (Bank FY/US$m)** | | | | | | | | | | |
| FY | | 2012 | 2013 | | | 2014 |  | |  |  |
| Annual | | 6 | 6 | | | 10 |  | |  |  |
| Cumulative | | 6 | 12 | | | 22 |  | |  |  |
| **GEF Estimated Disbursements (Bank FY/US$m)** | | | | | | | | | | |
| FY | | 2012 | 2013 | | | 2014 |  | |  |  |
| Annual | | 0.3 | 0.8 | | | 0.35 |  | |  |  |
| Cumulative | | 0.3 | 1.1 | | | 1.45 |  | |  |  |
| **Project Development Objective and Description** | | | | | | | | | | |
| **Original project development objective:** The objective of the project is to improve and increase access to electricity in Liberia.  Revised project development objective: Not applicable  **The Global Environmental Objective of this GEF component:** To reduce greenhouse gas emissions when compared with Liberia’s emissions growth baseline.  **Project description:** The project description is the same as in the original project which includes four components:  **Component A. Enhancing delivery of distribution services, including for low-income households;**  Sub-component A.1: Distribution network reinforcement and extension (IDA).  Sub-Component A.2: Connection of new low-income costumers (GPOBA).  Sub-Component A.3: Distribution network reinforcement and extension (Government of Norway).  **Component B. Enhancing options for power generation** (IDA)  **Component C. Providing** **modern renewable energy services to off-grid users**  Sub-component C.1: Renewable energy pilot activities in rural areas (AFREA, GEF).  Sub-component C.2: Technical Assistance (AFREA, GEF).  **Component D.** Technical assistance for the Ministry of Lands, Mines and Energy (IDA). | | | | | | | | | | |
| **Safeguard and Exception to Policies** | | | | | | | | | | |
| Safeguard policies triggered:  Environmental Assessment (OP/BP 4.01)  Natural Habitats (OP/BP 4.04)  Forests (OP/BP 4.36)  Pest Management (OP 4.09)  Physical Cultural Resources (OP/BP 4.11)  Indigenous Peoples (OP/BP 4.10)  Involuntary Resettlement (OP/BP 4.12)  Safety of Dams (OP/BP 4.37)  Projects on International Waterways (OP/BP 7.50)  Projects in Disputed Areas (OP/BP 7.60) | | | | | | | | [X]Yes [ ] No  [ ]Yes [X] No  [ ]Yes [X] No  [ ]Yes [X] No  [ ]Yes [X] No  [ ]Yes [X] No  [X]Yes [ ] No  [ ]Yes [X] No  [ ]Yes [X] No  [ ]Yes [X] No | | |
| Does the project require any waivers of Bank policies?  Have these been endorsed or approved by Bank management? | | | | | | | | [ ]Yes [X] No  [ ]Yes [ ] No | | |
| **Conditions and Legal Covenants:** | | | | | | | | | | |
| Financing Agreement Reference | Description of Condition/Covenant | | | | | | | Date Due | | |
| Section V.1 | The Recipient shall ensure the maintenance of a sound managerial capacity within the Project Implementation Entity as necessary for the successful implementation of the Project, in particular, that the defined technical core competencies, resources and performance standards of the Project Implementing Entity as have been furnished pursuant to the Management Contract shall remain in place during the implementation of the Project. In the event of any premature termination of the Management Contract, to the extent that such termination may, in the opinion of the Association, result in an adverse effect on the successful accomplishment of the objectives of the Project, the Recipient shall ensure the provision of an adequate alternative capacity within the Project Implementing Entity, with comparable technical core competencies, resources and achievement of performance standards necessary to carry out the Project, acceptable to the Association. | | | | | | | Recurrent | | |
| Section V.2 | Without limitation upon the provisions of Paragraph 1 of this Section V, and except as the Association shall otherwise agree, the Recipient shall exercise its rights under any material energy-related contract or arrangement in a manner which would not adversely affect the financial condition of the Project Implementing Entity or its ability to perform any of its obligations under the Project Agreement. In the event that the Recipient shall have exercised its rights under any such energy-related contract or arrangement which, independent of the Implementing Entity’s own actions, adversely affects the financial condition of the Project Implementing Entity or its ability to perform any of its obligations under the Project Agreement, the Recipient shall compensate the Project Implementing Entity on account of such contract or arrangement so as to ensure the continuing ability of the Project Implementing Entity to accomplish the objectives of the Project. | | | | | | | Recurrent | | |
| Section V.3 | Without limitation upon the provisions of Paragraphs 1 and 2 of this Section V, and except as the Association shall otherwise agree, in the event that the Recipient enters into any material energy-related contract or arrangement which could, independent of the Project Implementing Entity’s own actions, adversely affect the financial condition of the Project Implementing Entity or its ability to perform any of its obligations under the Project Agreement, the Recipient shall compensate the Project Implementing Entity on account of such contract or arrangement so as to ensure the continuing ability of the Project Implementing Entity to accomplish the objectives of the Project. | | | | | | | Recurrent | | |

# I. Introduction

1. In support of the Government of Liberia’s (GoL) efforts to improve and increase access to electricity, this Project Paper seeks the approval of the Executive Directors to provide an Additional Financing in an amount of US$22 million equivalent to SDR 14.2 million in IDA credit financing to the Republic of Liberia for the Liberia Electricity System Enhancement Project (LESEP - P129097). The proposed Additional Financing is being processed in accordance with the Rapid Response to Crisis and Emergency OP/BP 8.0. This Project Paper also seeks the approval of the Executive Directors to extend the closing date of the project by 6 months, from June 16, 2014, to December 31, 2014.
2. Given the emergency situation in Liberia’s power sector, the Bank processed LESEP under Rapid Response to Crisis and Emergency OP/BP 8.00 in 2010. LESEP supports directly the rehabilitation efforts to improve and increase access to electricity through the financing of distribution services and enhancement of supply generation options on-grid and off-grid. However, the situation in the power sector remains highly critical. Continued unavailability of electricity could result in deterioration of the fragile security situation in the country and adversely affect public services for health and education especially in Monrovia where one-third of the population resides. Thus, the Additional Financing is prepared under the same circumstances as its parent project at the end of 2010.
3. The Additional Financing will provide for additional or expanded activities that scale up LESEPs impact and development effectiveness in the following areas: (i) distribution network reinforcement and extension, (ii) enhancing options for power generation through the procurement of a thermal power plant of approximately 10MW; and, (iii) providing modern renewable energy services through a Global Environment Facility (GEF) financed lantern exchange program. The components can be readily scaled-up to increase the project’s impact and development effectiveness. The proposed additional financing retains the same project development objective (PDO) and scales up the results indicators of the original project. Institutional and implementation arrangements remain the same as for the original project. There is no change in the environmental category of the project and the Additional Financing does not trigger any new safeguard policies.
4. The Additional Financing is co-financed with the Global Environmental Facility (GEF) in the amount of US$1,454,540 and will directly support the activities envisaged in the component of providing modern renewable energy in areas originally financed by the Africa Renewable Energy Access trust fund (AFREA).

# II. Background and Rationale for Additional Financing in the amount of US$22 million.

1. In response to the Government of Liberia’s 2010 request to support its electricity sector, development partners provided emergency funding to the national electricity utility, Liberia Electricity Corporation (LEC), to procure a management contractor to improve the utility performance and to build up the customer base over a five-year period. The financing of the management contractor is ensured by the Government of Norway, while the International Finance Corporation (IFC) acted as transaction advisor. An investment package in support of the management contractor’s targets was made available by IDA, the Global Partnership on Output-Based Aid (GPOBA), and the Government of Norway. LEC’s management contractor, Manitoba Hydro International, has been in place since July 2010. The support provided has significantly accelerated the rehabilitation and expansion of the electricity utility. LEC is now engaged in a large on-grid electrification program that will extend access to some 33,000 new customers over a five year period. The customer base increased by 88 percent to 4,659 customers in July 2011 compared with 2,469 customers in July 2010.
2. The Bank’s support for this investment package was prepared through LESEP with a credit from IDA in the amount of SDR 6.5 million (US$10 million equivalent) in FY11. This credit allowed for the provision of investment financing for urgently needed distribution equipment and for enhancing options for power generation. Most of these funds have already been committed. During project preparation, and as reflected in the Emergency Project Paper, the urgent need of additional investments both in distribution and generation were highlighted. However, due to limited availability of IDA funds, these could not be responded to at the time.
3. The development objective of LESEP, as stated in the Financing Agreement (Credit Number 4842-LR), is to improve and increase access to electricity in Liberia. The project has four components with associated co-financing: (i) enhancement of distribution services (US$3.8 million IDA, US$10 million GPOBA, US$29 million Government of Norway); (b) enhancement of options for power generation (US$4.7 million IDA); (c) provision of modern renewable energy to off-grid users (US$2 million Africa Renewable Energy Access Program (AFREA)); and (d) technical assistance (US$0.8 million IDA). There are also unallocated amounts of US$0.7 million. Board approval was on November 30, 2010 and the project became effective on July 7, 2011. Table 1 presents LESEP’s financing plan and all parallel co-financing for which separate accounts were established.

**Table 1: Project cost for parent project LESEP**



1. The Project’s development outcome and implementation ratings are both rated “satisfactory” in the latest Implementation and Status and Results Report (ISR), which was completed shortly before project effectiveness. Tangible results are already apparent under the LESEP project as evidenced by the following facts:
2. *Enhancement of distribution services*. Contracts for the supply of transformers, cables, prepayment meters, and other distribution materials are in place. Delivery of the material and its installation and use for network strengthening and expansion is on-going. LESEP is financing transformers and cables. Due to the delay in effectiveness of the LESEP credit, it was agreed that these contracts would be pre-financed with funding from Norway. LEC is currently finalizing applications for the reimbursement from IDA, using the retroactive financing clause under the financing agreement. These activities represent around 40 percent of the total funding towards this component.
3. *Enhancement of options for power generation.* Under this component, the diesel plants operating at LEC will be overhauled and synchronized to the national grid. The procurement process is complete and the Bank team has extended its no objection for the signature of the draft contract for generation overhaul. A feasibility study and draft bidding documents for the Heavy Fuel Oil (HFO) storage facility and the pipeline infrastructure has been prepared indicating the most economic and commercially viable option for HFO as a future fuel in the power generation mix for LEC. These activities represent around 37 percent of total funding towards this component.
4. *Provision of modern renewable energy to off-grid users.* The contract for the rehabilitation of the micro-hydro power plant at Yandohun in Kolahun District, Lofa County has been awarded and work has commenced. These activities represent around 25 percent of total funding from AFREA for this component.

## *Rationale for Additional Financing*

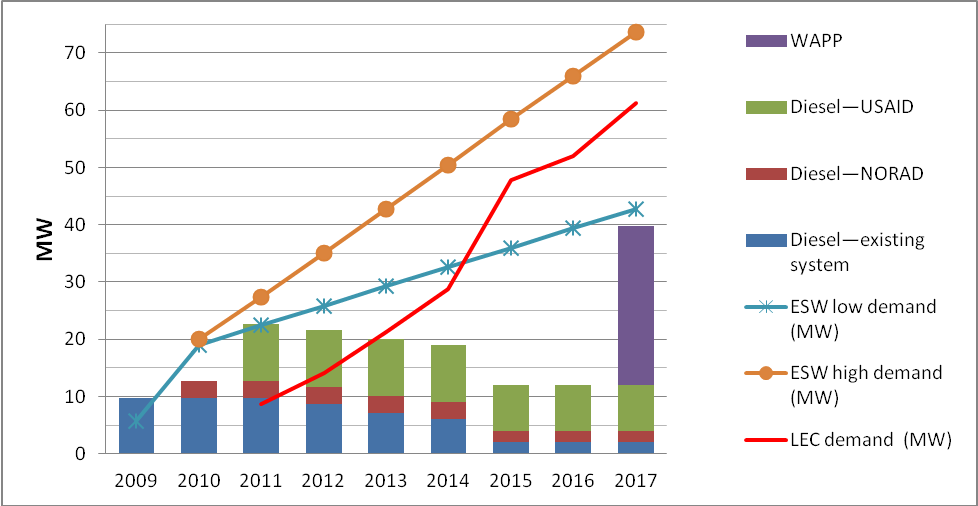
1. **Scaling up of LESEP:** there is an urgent need in the sector to fill the gap in available power generation, which is estimated to be about 10 MW. This need was identified through the Economic Sector Work prepared by the Bank in early 2010 and was recently confirmed through the Master Plan for expanding LEC prepared in early 2011. However, conventional donor finance has been unavailable. Attempts for the provision of power generation from the private sector, such as independent power producers (IPPs) have been unable to get to financial closure due to the complexities of such an undertaking in Liberia’s post-conflict environment. Lack of sufficient power generation sources creates a significant risk for LEC’s management contractor to miss his targets of connecting 33,000 customers and providing them with power. Provision of this additional power will also prevent outages for existing and future customers in accordance with the provisions of the management contract. Moreover, new generation options will also provide power at lower costs.
2. Following the arrival of the management contractor, LEC’s performance has shown significant improvements providing the basis for scaling up the development impacts of LESEP through an additional financing. Additional power supply availability will allow connecting residential and medium-commercial customers, which in turn will improve the financial sustainability of the electric utility further. Likewise, the additional distribution equipment will allow coordinated dispatch among the four current power supply facilities, putting in place a mechanism for more efficient, reliable and economic operation of the system.
3. As indicated during the preparation of LESEP, the management contractor had additional needs for distribution services to ensure all new customers would be connected as described under the Management Contract. More importantly, however, a significant gap in the financing of power generation was identified.
4. Upon the arrival of the management contactor, the existing system consisted of 9.3MW high speed diesel generation units at Kru Town, Bushrod Island, Congo Town and Paynesville. The units were provided by the emergency donor funded program between 2006 and 2008. The units were operated as isolated systems since the original distribution and transmission systems were destroyed.
5. Whereas high diesel speed diesel generation units should normally be operated on a continuous basis at 70 percent of their prime rating or at their higher prime rating for few hours as peak output, these units were constantly used above their higher prime rating, which has negatively impacted their reliability. Additionally, the reliability of the existing units was impacted by the following reasons:

* Corrosion of the radiators on several units due to the coastal conditions
* Corrosion of electrical components due to the coastal conditions
* A lack of spare parts
* A lack of diagnostic equipment and tools for repairs
* A need for improvement in the maintenance and repair procedures
* Lack of O&M procedures and preventative maintenance
* Accelerated deterioration of some components due to a lack of operating, maintenance and diagnostics experience
* Removal of parts from inoperative units to keep others operating.

The above issues have reduced the lifespan of the units. Although they are available today, their lifespan is likely to have been significantly shortened due to the way these units have been operated.

1. In an effort to address these challenges, donors reallocated some of the resources to address the most urgent needs. Following a request from the GoL, USAID reallocated financing originally earmarked for distribution to the purchasing and commissioning of 10 MW of additional high speed diesel generation. To minimize the then arising shortfall for distribution, additional funding for the enhancement of the distribution network and connections was made available under USAID’s rural electrification program, and through funding from LESEP. By early 2011 an additional 10 MW of diesel generation were installed on Bushrod Island, which is part of the city of Monrovia.
2. Despite this assistance, it is estimated that a power supply gap will re-emerge as early as 2013 (see Figure 2). The supply gap is at least 10 MW in 2013, depending on the demand scenario, and will increase to 18 MW in 2014 and 24 MW in 2015. It is expected that JICA will fund heavy fuel oil (HFO) power generation of 10 MW, which is expected to be commissioned by 2015. However, a gap of around 10MW remains from 2014 onwards. Based on current generation expansion plans and the expected load characteristics, it is expected that the most economic generation stacking would involve 18-20 MW of thermal power generation. From 2017, 18 MW of power from the WAPP transmission line could supply base and possibly shoulder loads[[1]](#footnote-1). Mount Coffee hydropower generation, that could be on-line from 2017, will supply electricity at a lower cost. However, there is still a need for thermal power generation to compensate the seasonal fluctuations of the Saint Paul River, on which Mount Coffee hydropower plant is located. Correspondingly, the supply from Mount Coffee hydropower plant will decline from 64 MW to 8 MW in the dry season. To sum up, and as Figure 2 indicates, the generation gap will be in the order of 25 MW by 2015. This clearly indicates the need for additional 10 MW of power by 2014/2015.
3. Moreover, more permanent and less costly power is needed for the electricity system to transition out of its current mode of emergency operations, which is marked by insufficient supply and high costs of electricity at US cents 52/kWh. Indeed, Liberia has among the highest electricity tariffs in the world. This needs to change if the country is to develop economically. The system thus needs to be expanded to reduce the relative share of overhead costs, and to introduce lower cost power generation such as Heavy Fuel Oil (HFO).
4. Finally, given the organic way in which the power supply has been augmented, there is an urgent need for it to be coordinated so that the power available can be more efficiently dispatched to the newly connected customers. While the original LESEP is already providing support for synchronization of the existing generators to the power grid, a more structured dispatch system is urgently required.

**Figure 2: Supply-Demand Forecast for the Medium-Term 2010 - 2015[[2]](#footnote-2)**



1. The proposed investments will support the ability of LEC to meet part of the demand. It is expected that the residential customer base will increase due to the availability of power generation, more efficient dispatch of the system, and the GPOBA financing that will provide support to 16,000 poor and low income households. In late 2011 the customer base indicates that residential customers represent 47 percent. Existing residential customers may be further broken down into kWh consumption ranges considered to be reasonably representative of income levels and the distribution is as follows: 26 percent poor, 35 percent low income, 20.6 percent middle income, 13 percent upper income, and 5.4 percent high income customers.
2. **GEF Co-financing:** in tandem with urban electrification efforts, the Government of Liberia requested a grant from the Global Environment Facility (GEF) to provide off-grid energy services outside of Monrovia. This grant will build on the original Component C for the provision of modern renewable energy off-grid financed by the Africa Renewable Energy Access (AFREA) trust funded program. The grant will support launching the World Bank/IFC Lighting Africa program in Liberia, which would primarily comprise a solar lantern exchange program entitled “Lighting lives in Liberia.” This grant will scale up the development of sustainable energy in off-grid areas through facilitating the provision of modern, solar-based lighting supplies and services. The activity will transfer knowledge, tools, and lessons from Lighting Africa’s pilot activities in Kenya and Ghana and adapt these instruments for use by the key stakeholders in Liberia. The co-financing has been approved by the GEF CEO and the GEF Council, as of September 18 and November 9, 2011, respectively.
3. The RREA is the first agency of its kind in the history of Liberia, and its establishment reflects the emphasis put on rural energy access as well as environmental sustainability in Liberia’s National Energy Policy (NEP), which calls for electrifying 15% of rural Liberia and 30% of the country’s urban and peri-urban areas by 2015. Toward this end, the establishment and capacity building of the RREA has been supported by the AFREA program since August 2009, and has benefited from application of international best practices as well as regional knowledge exchange. The solar market pilot project of the AFREA program represents a sound opportunity for scale-up that would result in delivery of renewable energy hardware on the ground, as the AFREA work is designed to address barriers to commercial off-grid lighting development.
4. The GEF co-financing will allow for leveraging the gains made, by actually testing the market. The success of the AFREA program has also leveraged co-financing from the EU Energy Facility toward further development of the RREA’s rural energy strategy and application of the SSMP approach in one county. These accomplishments and the NEP notwithstanding, the financing available for scaling up Liberia’s rural access agenda is far from what is needed to achieve Liberia’s policy objectives. The proposed GEF financing presents a unique opportunity to increase the flow of resources to supporting the adoption and acceleration of solar technologies in Liberia on a semi-commercial basis, so that Liberia can begin making real progress toward its sustainable energy goals.
5. To sum up, the additional financing will support the original project design in the areas of: (i) enhancement of distribution services and (ii) enhancing options for power generation. Through the GEF grant it also provides modern renewable energy to remote areas through a lantern exchange program. These components can be readily scaled-up to increase the project’s impact and development effectiveness. Providing modern energy services to rural areas will also mitigate the current pressure on the fragile infrastructure in Monrovia which is already home to one third of Liberia’s population.

# III. Proposed Changes

1. The proposed Additional Financing retains the same Project Development Objectives (PDO). The Project Outcome Indicator will remain the same as well. However, intermediate results will be scaled up with a few additional indicators added as indicated in Table 2. In particular, the following intermediate results will be scaled up with the proposed expansion:

* *Intermediate result (b): Construction of distribution network:*
  + Original: Number of transformers and auxiliary services
  + Additional: System control and communications system procured and installed
* *Intermediate result (d): Enhancing options for power generation:* 
  + Original: First phase of main generating units overhaul completed
  + Original: HFO pipeline and storage facility operational
  + Additional: approximately 10 MW of thermal power generation plant procured and commissioned
* *Intermediate result (e):* *Providing Modern Renewable Energy Services to off-grid components:*
  + Original: Micro-hydro power pilot built
  + Original: SSMF delivered
  + Additional: 100,000 Lighting Africa approved solar lanterns in use.

1. There is no change in the overall design of the project. The institutional, financial, disbursement, procurement and implementation arrangements are the same as for the original project. There is also no change in the safeguards category and the additional financing does not trigger any new safeguard policies.
2. The additional financing will scale up the PDO and will require additional time for the implementation compared with the original closing date of June 16, 2014. The design, procurement, construction and commissioning of the proposed thermal power plant has been estimated to be implemented in a timeframe of 18 months. Therefore an extension of the closing date of the original credit by six months is required. As confirmed during appraisal, thenew closing date is December 31, 2014.

**Table 2: Project outcome indicators**

|  |  |  |  |
| --- | --- | --- | --- |
| ***Indicator*** | ***Original target*** | ***Changes with AF*** | ***Revised target*** |
| No. of connections to electricity grid | 4,066 | - | 4,066 |
| No. of urban households connected to electricity | 1,020 | - | 1,020 |
| No. of transformers and auxiliary services supplied | 375 transformers supplied |  | 375 transformers supplied |
| System control and communications system procured and installed |  | 1 distribution control and communication system procured | 1 distribution control and communication system procured |
| First Phase of main generating units overhaul completed | First phase completed | - | First phase completed |
| HFO pipeline and storage facility operational | HFO pipeline and storage facility operational |  | HFO pipeline and storage facility operational |
| Thermal power plant procured and commissioned |  | Thermal plant procured | Thermal plant commissioned |
| Micro hydro-power pilot built | 1 |  | 1 |
| SSMF delivered | 1 |  | 1 |
| 100,000 Lighting Africa approved solar lanterns in use |  | 100,000 approved solar products in use | 100,000 |
| LEC staff trained  (cumulatively) | 50 |  |  |

1. Table 3 below sets out the revised Project costs by component indicating the original allocation, as well as the proposed allocation for additional financing on a component by component basis.

**Table 3: Costs by component financed by IDA only (in US$)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Original cost** | **Changes with AF** | **Revised cost** |
| **Component A.1: Distribution Services**   * Sub-component A.1: Distribution network reinforcement and extension (US$3.8 million of IDA) * Sub-Component A.2: Connection of new low-income customers (US$10 million of GPOBA) * Sub-Component A.3: Distribution network reinforcement and extension (US$29 million of Norway) | 3.8  -  - | 3.0  -  - | 5.8  -  - |
| **Component B: Enhancing Options for Power Generation** | 4.7 | 16.0 | 20.7 |
| **Component C: Providing Modern Renewable Energy Services (US$2 million of AFREA)** | - | - |  |
| **Component D: Technical Assistance** | 0.80 | 0.5 | 0.80 |
| **Unallocated** | 0.70 | 2.5 | 4.70 |
| **Total** | **10.00** | **22.00** | **32.00** |

Table 4 below shows the different contribution of other donors to the Additional Financing proposed for IDA as well as a breakdown of activities to be financed.

**Table 4: Financing Plan for the Additional Financing for LESEP**



# IV. Appraisal Summary

1. **Technical.** The proposed additional activities under the Project present no unusual construction or operational challenges. Under Component A, the project supports conventional investments on the distribution network to enhance the delivery of electricity that will include the installation of distribution equipment with the aim of increasing connections to new customers, including low-income households. The Project also supports conventional investments for communication and synchronisation equipment that would allow the system to be centrally dispatched with the aim of achieving operation efficiencies. Under Component C, the project will provide additional financing for the procurement of thermal power plant in order to ensure that new customers can be reliably supplied with electricity in the medium-run. This is also conventional and well known technology.
2. The investments undertaken will be implemented according to internationally accepted technical criteria and standards. The technical parameters and estimated costs for all the project components have been evaluated by the engineering department of Manitoba Hydro International (MHI), LEC’s management contractor. MHI disposes of cutting edge knowledge in this area, which enables MHI to readily craft technical specifications; to smoothly evaluate proposals received during calls for bids; and to supervise and monitor the execution of works as has been demonstrated during 2010/2011, which was their first year as management contractors.
3. The new GEF grant in support of Component C of the Project supports the scale-up of the solar market facilitation effort already underway through a solar lantern exchange program. The program represents an innovative approach for seeding the market on a private-public partnership basis, which is meant to catalyze a fully private sector driven approach. However, the proposed off-grid lighting products for use in the lantern exchange program have undergone rigorous testing through the “Lighting Africa” quality assurance program, and commercial dissemination has been supported in Sub-Saharan Africa since 2007 indicating high technical reliability of these products. The RREA, which is the implementing agency for this component, has been able to build adequate technical and administrative capacity in the implementation of the AFREA program, and the proposed co-financing does not impose any new requirements in that regard.
4. **Financial Management.** The financial management system in operation at both LEC and RREA meet the minimum standards required by the Bank. While the proposed financial management arrangements of the project satisfy the Bank’s minimum requirements under OP/BP 10.02, the overall financial management risk was assessed as ‘*Substantial’* under the original operation but reduced to a residual risk rating of ‘*Moderate*’ in respect of LEC in view of the risk mitigation measures implemented by MHI. LEC will be responsible for the implementation of the IDA financing and RREA for the GEF grant.
5. **Procurement Arrangements**. LECis in compliance with the Liberian Public Procurement and Concessions Act, has a procurement unit staffed with officers with good academic background, has adequate internal technical and administrative controls and anti-corruption measures and appeals mechanisms for bidders. Further, the Management Contractor MHI has started the capacity of the local staff to handle donor funded projects. However, the recent resignation of executive director of the procurement department has to be addressed in order to support the procurement activities of donor funded programs. In order to remedy this risk, the procurement capacity at LEC will be strengthened through the recruitment of a procurement officer and through dedicated training for LEC staff on procurement under the Additional Financing.
6. As a Government agency, the RREA responds to the rules of the Liberian Public Procurement and Concessions Commission. As the RREA is a newly established agency, however, the full statutes establishing the Agency have been in final draft stage for over a year as the Legislature have not yet ratified the required legislation. It is hoped that the Legislature, which is currently on agricultural break until January 2012, will soon ratify the legislation. Through LESEP, RREA has now started building a procurement management track record, in procurement planning, preparation of bidding documents, management of bidding process from advertisement to bid opening, bid evaluation, contract award, preparation and signing of contract, contract management and the general handling of the procurement cycle. The overall procurement risk is high.
7. **Financial Analysis (project financials)**. The financial analysis indicates that the proposed Additional Financing is financially viable under the two scenarios of possibilities for thermal generation. Under the scenario of procuring an HFO thermal plant, LEC would achieve a Financial Internal Rate of Return (FIRR) of 22.7 percent and a Net Present Value (NPV) of US$29 million for this additional activity. If medium speed dual fuel plant were selected, LEC would achieve a FIRR of 13.5 percent and a NPV of $17 million for this additional activity. Under both cases, LEC would be able to reimburse the IDA credit.
8. Additional sensitivity analysis has been carried out to assess the financial viability of the additional investments under various scenarios including (i) switching value in terms of number of years that medium speed dual fuel plan can run with diesel in order to be viable, (ii) changes in electricity tariffs; and (iii) changes of the capacity factor. The project will start becoming financially unattractive (i) if the medium speed dual fuel plant runs for more than 4 years on diesel; (ii) if the tariff were decreased by over 22 percent for the HFO power plant and 13 percent for the medium speed dual fuel plant; and (iii) if the capacity factor is lower than 16 percent for the HFO power plant and lower than 24 percent for the medium speed dual fuel plant.
9. **Environmental and Social Safeguards (Category B).** The safeguard category of the LESEP with the additional financing remains as B since there are no significant and/or irreversible adverse environmental and social issues expected from electricity infrastructure components financed under the proposed project. The World Bank policies for Environmental Assessment (OP/BP 4.01) and Involuntary Resettlement (OP/BP 4.12) are nevertheless triggered. In general, the project is expected to positively impact the beneficiary communities and individuals as access to electricity will reduce the cost of engaging in productive uses, improve safety, and enable better education and health services. Potential negative environmental and social impacts of the proposed project activities are expected to be small-scale and site-specific.
10. Under the original project, an Environmental and Social Management Framework (ESMF) and the Resettlement Policy Framework (RPF) have been prepared and disclosed. These frameworks describe what actions are to be taken when encountering a safeguards issue in the energy sector. Both instruments are designed to guide LEC and the RREA as implementing agencies for their respective components. The ESMF and RPF were disclosed in Infoshop on September 14, 2010. The activities under the Additional Financing will build on these two frameworks. For the proposed thermal power plant and fuel off-loading and storage facility both an ESIA and a RAP are being procured.

# Annex 1: Results Framework and Monitoring

**Additional Financing: LIBERIA Electricity System Enhancement Project**

**Results Framework**

| **Revisions to the Results Framework** | | **Comments/ Rationale for Change** |
| --- | --- | --- |
| **PDO** | | |
| **Current (PAD)** | **Proposed** |  |
| Improve and increase access to electricity |  | (No change) |
| **PDO indicators** | | |
| **Current (PAD)** | **Proposed change\*** |  |
| Improve access to electricity in Monrovia post-conflict | Continued |  |
| **Intermediate Results indicators** | | |
| **Current (PAD)** | **Proposed change\*** |  |
| Construction of distribution network | Continued |  |
| Securing power generation | Continued |  |
| Enhancing options for power generation | Enhancing options for power generation and supply of thermal power plant | “Enhancing options” is still valid as it pertains to the rehabilitation of the HFO offloading infrastructure; the additional financing for the power plant is also now reflected. New unit of measurement added to reflect addition of power plant. |
| Demonstrating renewable power for modern energy services | Continued | New unit of measurement added: 100,000 Lighting Africa approved solar lanterns in use (cumulatively). |
| Enhancing capacity to deliver electricity services | Continued |  |

**\* Indicate if the indicator is Dropped, Continued, New, Revised, or if there is a change in the end of project target value**

**Revised PRoject Results Framework**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Project Development Objective (PDO): Improve and increase access to electricity**  **Click here to enter the revised PDO of your operation** | | | | | | | | | | | | | |
| **PDO Level Results Indicators[[3]](#footnote-3)** | | **Core** | **UOM[[4]](#footnote-4)** | **Baseline**  **Original Project**  **Start**  **(2010)** | **Progress To Date**  **(2011)****[[5]](#footnote-5)** | **Cumulative Target Values[[6]](#footnote-6)** | | | | **Frequency** | **Data Source/**  **Methodology** | **Responsibility for Data Collection** | **Comments** |
| **2011** | **2012** | **2013** | **2014** |
| Connections to electricity grid in Monrovia | |  | Number | 2,162 | 5,158 | 8,050 | 12,033 | 16,017 | 20,000 | Annual | LEC data system | LEC |  |
| **People in urban areas provided with access to electricity under the project by household connections** | |  | Number | 0 | 200 | 500 | 1,000 | 1,500 | 2,000 | Annual | LEC data system | ? |  |
| **Electrification rate in Monrovia** | |  | % | 0.53% | **1.4%** | 2% | 5% | 7% | 12% | Annual | LEC data system | ? |  |
| System Average Interruption Frequency Index (SAIFI) for customers in Monrovia | |  | Number | 20 | 20 | 18 | 16 | 12 | 10 | Annual | LEC data system | ? | Units of interruptions per customer in a year and annual target. |
| Direct project beneficiaries, of which female (beneficiaries) **[[7]](#footnote-7)** | |  | Number  (%) | ? | ? | 1,250 (50%) | 2,500 (50%) | 3,750 (50%) | 5,000 (50%) | Annual | LEC data system | LEC | Based on average household size in Monrovia of 5 persons, and female to male ratio of 100.2 (Liberia National Population and Housing Census, 2009). |
| **Intermediate Results and Indicators** | | | | | | | | | | | | | |
| **Intermediate Results Indicators** | | **Core** | **Unit of Measurement** | **Baseline**  **Original Project**  **Start**  **(2010)** | **Progress To Date**  **(2011)** | **Target Values** | | | | **Frequency** | **Data Source/**  **Methodology** | **Responsibility for Data Collection** | **Comments** |
| **2011** | **2012** | **2013** | **2014** |
| **Intermediate Result 1:Distribution network reinforcement and extension (Component A)** | | | | | | | | | | | | | |
| *Intermediate Results Indicator One:* Transformers and auxiliary services supplied | |  | Number | 0 | 300 | 300 | 375 | 375 | 375 | Annual | LEC data system | LEC |  |
| **Intermediate Result 2: Enhancing options for power generation (Component B)** | | | | | | | | | | | | | |
| *Intermediate Results Indicator One:* First phase of main generating units overhaul completed | |  | Yes/No | No | No | Yes | Yes | Yes | Yes | Annual | LEC data system | LEC |  |
| *Intermediate Results Indicator Two:* HFO pipeline and storage facility operational | |  | Yes/No | No | No | No | No | Yes | Yes | Annual | LEC data system | LEC |  |
| *Intermediate Results Indicator Three:* Thermal power plant installed | |  | Yes/No | No | No | No | No | No | Yes | Annual | LEC data system | LEC |  |
| **Intermediate Result 3: Providing modern renewable energy services to off-grid users (Component C)** | | | | | | | | | | | | | |
| *Intermediate Results Indicator One:* Generation capacity of renewable energy constructed under the project | |  | MW | 0 | 0 | 0 | 0.06 | 0.06 | 0.06 | Annual | RREA data system | RREA |  |
| *Intermediate Results Indicator Two:* Sustainable Solar Market Facilitation delivered | |  | Yes/No | No | No | No | Yes | Yes | Yes | Annual | RREA data system | RREA |  |
| *Intermediate Results Indicator Three:* 100,000 Lighting Africa approved solar lanterns in use | |  | Number | 0 | 0 | 0 | 20,000 | 60,000 | 100,000 | Quarterly | RREA data system | RREA |  |
| **Intermediate Result 4: Technical assistance (Component D)** | | | | | | | | | | | | | |
| *Intermediate Results Indicator One:* People trained under the project |  | |  | 0 | 10 | 10 | 30 | 50 | 50 | Quarterly | LEC data system | LEC |  |

|  |
| --- |
| Annex 2: Operational Risk Assessment Framework (ORAF) **LIBERIA: Additional Financing for the Liberia Electricity System Enhancement Project (LESEP)**  **Stage: Appraisal**  **OR**  **Negotiations**  **OR**  **Board** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. **Project Stakeholder Risks** | | | **Rating: Moderate** | | | | | |  | | | | | | | |
| **Description: Potential lack of effective donor coordination:** Implementing donor support effectively during post-conflict years is difficult since as a post-conflict country Liberia faces political and administrative constraints that reduce their capacity to absorb funds and coordinate donors. Given the overriding need of resources of any kind, it is arguably difficult for Liberia to maintain a coherent strategy. However, in the energy sector, donors, including the World Bank, have closely coordinated their actions since the new GoL came into power in 2005. As a result, concrete actions have been achieved that ensure donor commitment and alignment in terms of rebuilding the electricity sector in Liberia. There is donor consensus on how to prioritize interventions over the short-, medium- and long-term. Both the Management Contract at LEC and the LESEP project itself provide concrete examples of successful donor coordination. | **Risk Management:** Donors are working towards further formalizing their coordination in the energy sector through a Memorandum of Understanding and regular technical working group. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | **Stage: Implementation** | | | **Due Date: Ongoing** | | | **Status: Ongoing** | | |
| **Description: Management Contractor could withdraw:** The Management Contract provides substantial support and expertise in rebuilding the power utility LEC, and is therefore an important partner for this project. If the Management Contractor were to withdraw from their contract, it would affect the quality and speed with which LESEP is being implemented. | **Risk Management:** The Management Contractor is well established. Payments come directly from Norwegian aid, and are thus unaffected by LEC’s performance. After 1.5 years of operation, the MC is firmly established at LEC. | | | | | | | | | | | | | |
| **Resp: Client** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | | **Status: Ongoing** |
| 1. **Operating Environment Risks** (not disclosed) Section to be removed when the PAD is (i) sent to the client for negotiation or (ii) sent to the Board for approval | | | | | | | | | | | | | | | | |
| * 1. **Liberia** | **Rating: High** | | | | | |  | | | | | | | |
| **Description:** The security situation in Liberia remains fragile owing to the large number of (mostly) unemployed ex-combatants and the fragile political situation which is now being tested with the upcoming national run-off elections (November 8, 2011).  The results of the November elections, even if won by the current President, could mean important cabinet and upper management changes. If the incumbent wins, there will be a window of opportunity to build support for a strengthened policy reform agenda. A change in political leadership, not likely, could signify a six-month delay in Bank program implementation. | **Risk Management:** The UN recently extended their UNMIL security program through to the end of 2012 and will continue to support training of the local police force. The UN Peace Building Fund, in preparation for eventual disengagement, is also focusing on decentralizing efforts on rule of law, security sector reform, and national reconciliation.  The Bank is preparing a series of policy notes and analytical work that will help inform the Government’s next Growth and Poverty Strategy, a first draft of which will be available for consultation with all stakeholders in early 2012. The new CAS will be prepared for delivery in early FY 12. If a new administration is elected, the Bank Group will immediately engage in global and sector policy dialogue in order to ensure the preparation of the new CAS in the first semester of FY 12. The Bank will also discuss the need for continuity of key project implementation and fiduciary staff in Bank financed operations. | | | | | | | | | | | | | |
| **Resp: Client** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | | **Status: Ongoing** |
| * 1. **Sector/multi-sector** (description and rating are not disclosed) | **Rating: Substantial** | | | | | |  | | | | | | | |
| **Description:** While a National Energy Policy (NEP) has been adopted, in practice GoL’s policy is often guided by day-to-day emergencies in a context of weak institutions, lacking capacity, and competing interests. It is thus difficult to pursue coherent long-term policies. | **Risk Management:** The Bank has completed an Economic and Sector Work (ESW) that sets out options and issues for the development of Liberia’s energy sector and can serve as a road map. This road map is being utilized by the GoL in the development of the energy sector priorities for the PRS II period (2012 – 2017). The Bank is also working closely with the Donor community to ensure a coherent approach vis-à vis the GoL. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | **Stage: Implementation** | | | **Due Date: Ongoing** | | | **Status: Ongoing** | | |
| **Description:** Technical capacity to absorb generation from an IPP(s) by the distribution network: the risk is associated with an IPP’s scale relative to the present distribution network of LEC. If LEC is unable to adequately increase its system and customer base to a level that can effectively utilize the IPP generation project, even modest shortfalls in demand would significantly increase LEC’s cost of energy from the IPP generation project and could result in financial losses. | **Risk Management:** The Management Contractor in May 2011 finalized a detailed least cost expansion plan based on load forecasts for both the 5-year duration of the Management Contract and a 20-year planning horizon. This plan identifies the investment needed in distribution and generation to meet the demand. The current additional financing is being prepared based on the findings of the MC’s plan, and will result in a larger and more robust system. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | **Stage: Preparation** | | | **Due Date:** | | | **Status: Ongoing** | | |
| **Description:** Lack of access to low-cost power options**:** In order to be able to expand the power system in Monrovia on a sustainable basis, there is a need for lower cost options to become available over time. These would include HFO, hydropower, and import of power from abroad. A larger-sized higher cost IPP that would lock in the energy sector’s demand could present a threat to establishing access to low cost options over the long-term. | **Risk Management:** The LESEP project provides financing for necessary infrastructure to allow for the future development of lower cost HFO. The proposed additional financing would enable the government to install an HFO power plant, which would lower the cost of generation by about 40% and fill the critical generation gap expected by 2014. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | | | **Stage: Preparation** | | **Due Date:** | | | | **Status: Ongoing** |
| 1. **Implementing Agency Risks (including fiduciary)** | | | | | | | | | | | | | | | | |
| * 1. **Capacity** | **Rating: Moderate** | | | | | | | | | |  | | | |
| **Description: Weak financials of LEC:** LEC’s financial situation is difficult both in terms of cash-on-hand and cash flow. LEC’s financial situation could deteriorate further once third-party obligations materialize, such as through an IPP. The Management Contractor for LEC has made considerable efforts to improve the financial viability of LEC. | **Risk Management:** The World Bank is engaging together with the other donors active in the sector to secure the sector financials for LEC. LESEP will support the sector financials by extending customer connections, which will help raise LEC’s revenue. The additional financing will further raise revenue by facilitating the connection of high-value customers based on higher efficiency thermal generation. | | | | | | | | | | | | | |
| **Resp: Client** | | | | | **Stage: Implementation** | | | **Due Date: Ongoing** | | | **Status: Ongoing** | | |
| **Description: Inadequate technical capacity to implement the project:** The public service has a general lack of well qualified middle and senior level staff. Even if LEC has some highly qualified staff especially at senior level, the gap in training of personnel with knowledge in electricity systems that is due to the civil war still remains. However, the Management Contract has brought in highly qualified staff that reduces the overall risk rating substantially. Financial Management and Procurement Assessment on the Management Contractor assessments have been conducted and were found to be broadly aligned with World Bank guidelines and with little need for additional capacity building. The Management Contractor has also relevant practical experience on implementing similar projects under the same context in Africa, as well with World Bank and donor’s support that mitigate the risk related to capacity. Finally, capacity building support for lower staff is ongoing with support from the World Bank (LESEP), NORAD, and USAID. | **Risk Management:** For those parts that ex post may be found lacking in capacity, the project will provide technical assistance. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | | **Status: Ongoing** |
| * 1. **Governance** | **Rating: Moderate** | | | | | | | | | |  | | | |
| **Description: Lack of regulatory agency or function:** Liberia has never had a regulatory body for the energy sector, and all regulation has been undertaken by contract. This may entail the risk of tariff policy being set below cost recovery level, and its implicit consequences on LEC’s financial viability. | **Risk Management:** Since LEC resumed operations in 2006, LEC’s tariff policy has been based on an adjustment formula that ensures underlying costs of electricity can be passed through to the consumer. The management contractor has continued this policy and introduced additional controls, which resulted in LEC being a profit-making corporation for the first time in its post-war history. | | | | | | | | | | | | | |
| **Resp: Client** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | | **Status: Ongoing** |
| **Fraud & Corruption (sub-category of Governance risk)**  Remove Risk Description and Rating when the PAD is (i) sent to the client for negotiation or (ii) sent to the Board for approval  Risk management measures below to be merged with those in 3.2 above. | **Rating: Moderate** | | | | | |  | | | | | | | |
| **Description:** (this description and rating are not disclosed)  **There is an overall risk of fraud and corruption in the country:** The main risk includes a systemic weakness regarding tracking fraud and corruption cases and enforcing counter-measures, which makes project funds vulnerable to the risk of being misused. In the context of LEC, the Management Contractor, which has an international reputation to defend, strictly ensures adherence to best practice standards of transparency and accountability of fund use. | **Risk Management :**  In addition to the measures in place, under LESEP, LEC as the implementing agency will be strictly following World Bank fiduciary rules and fraud and corruption guidelines. | | | | | | | | | | | | | |
| **Resp: Client** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | **Status: Ongoing** | |
| 1. **Project Risks** | | | |  | | | | | | | | | | | | |
| * 1. **Design** | | **Rating: Low** | | | | | |  | | | | | | |
| **Description:** The project includes standard applications typical and mainstream for energy projects. | **Risk Management:** Project design has followed best practice for energy sector applications. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | | | **Stage: Preparation** | | **Due Date: Completed** | | | | **Status: Completed** |
| * 1. **Social & Environmental** | **Rating: Low** | | | | | | |  | | | | | | |
| **Description:** The original LESEP project as well as the additional financing fall into environmental category B, as no adverse long-term impacts are anticipated. The project is expected to positively impact the beneficiary electricity customers and communities as electricity will allow their productive activities to extend beyond nightfall, and children will be expected to benefit from being able to safely learn after dark. Negative impacts are expected to be small in scale and site-specific. | **Risk Management:** Where project activities will potentially impact negatively on people living and/or working on or near the project areas, the procedures as described in the ESMF and RPF will become applicable. An ESIA will be prepared for the power plant to be installed with the additional financing. Accordingly, people will be compensated and/or resettled for any loss that they may incur due to project activities. Likewise, no project activities affecting people’s livelihoods will be implemented until a resettlement action plan (RAP) has been prepared, approved (by GoL and the World Bank) and disclosed. | | | | | | | | | | | | | |
| **Resp: Client** | | | | | | | **Stage: Implementation** | | **Due Date: June 30, 2012** | | | | **Status: Ongoing** |
| * 1. **Program & Donor** | **Rating: Low** | | | | | | |  | | | | | | |
| **Description: Delay or short-fall in donor funding:**  There are a number of donors with an interest in the energy sector and their objectives are well aligned with the project. Delay in financing, for example by the Government of Norway, could delay the overall results expected under the Management Contract, but would not necessarily impact the implementation of the Bank-funded components. | **Risk Management:** To date, since project implementation, the only delay has been in the effectiveness of LESEP, which was due to the judicial procedures of the GoL. During that time period, Norwegian aid continued to provide pre-financing to ensure milestones were achieved by the management contractor. The Bank team will continue to engage with the donors in order to ensure timing of interventions is well coordinated. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | | **Status: Ongoing** |
| * 1. **Delivery Monitoring & Sustainability** | **Rating: Moderate** | | | | | | |  | | | | | | |
| **Description: Unclear responsibilities for management of future HFO pipeline and storage facilities:** Facilities associated to pipe and store HFO have been destroyed during the civil war. As a result, HFO cannot be landed in Liberia. The reconstruction of the facility is being financed under the LESEP project, and LEC will act as implementing agency. However, it is not clear which entity would own and operate the delivery infrastructure. | **Risk Management:** A Bank-financed feasibility study has been completed, and looked at the different alternatives to propose a suitable routing of the HFO pipeline and location of the storage tanks. Government finalization of the rehabilitation plan is still ongoing, but it is anticipated to be a public-private partnership, with the Bank supporting the rehabilitation of tanks and pipeline on the LEC side. While there remains an uncertainty as to who will be responsible for this facility, it is mitigated with the help of the ongoing rehabilitation plan, which should resolve this issue. The project will benefit from the results of a feasibility study that will analyze two technologies HFO-fired of dual-diesel plant in order to estimate the financial gains of both options and evaluate the readiness on the implementation of the HFO handling and storage facilities. | | | | | | | | | | | | | |
| **Resp: Client** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | | **Status: Ongoing** |
| **Description:** Delays in implementation. The main risk is delays in the implementation of the project activities due to the country’s post-conflict context and LEC’s lack of capacity. The presence of the Management Contractor limits extended delays and will ensure that capacity is built within LEC. | **Risk Management:** Under the LESEP project, the World Bank has undertaken close project supervision to ensure that delays in implementation are minimized. The same close supervision will be continued under implementation of the additional financing. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | | **Status: Ongoing** |
| **Description:** Prior to and during LESEP, additional funding has been sought from donors engaged in the sector, both for meeting the looming generation gap and for adequately extending the distribution infrastructure. To date, no additional financing has been confirmed for the near term, and the Government of Liberia does not have sufficient resources to bring the project to effective scale. | **Risk Management:** Though LESEP was tailored according to the funds available, the additional financing under preparation is in response to the GoL request for assistance in meeting the critical generation gap. Bringing additional sources of generation onstream will help improve the economic efficiency of the utility and will greatly improve the sustainability of the LESEP and management contract interventions. | | | | | | | | | | | | | |
| **Resp: Bank** | | | | | | | **Stage: Implementation** | | **Due Date: Ongoing** | | | | **Status: Ongoing** |
| * 1. **Other** | **Rating:** | | | | | | |  | | | | | | |
| **Description :** | **Risk Management :** | | | | | | | | | | | | | |
| **Resp:** | | | | | | | **Stage:** | | **Due Date :** | | | | **Status:** |
| * 1. **Other** | **Rating:** | | | | | | |  | | | | | | |
| **Description :** | **Risk Management :** | | | | | | | | | | | | | |
| **Resp:** | | | | | | | **Stage:** | | **Due Date :** | | | | **Status:** |
| **Nondisclosable Information for Management Attention (Optional)**  Section to be removed when the PAD is (i) sent to the client for negotiation or (ii) sent to the Board for approval | | | | | | | | | | | | | | | |
| **Comments:** | | | | | | | | | | | | | | |
| 1. **Project Team Proposed Rating Before Review** | | | | | | | | | | | | | | | | |
| * 1. **Preparation Risk Rating:** Section to be removed when the PAD is sent to the Board for approval **Moderate** | | | | **5.2 Implementation Risk Rating:** Section to be removed when the PAD is sent to the Board for approval **Substantial** | | | | | | | | | | |
| **Comments:** Section to be removed when the PAD is sent to the Board for approval The lower rating for preparation is due to the fact that the basic design of the project is simple and that during preparation the Management Contractor has been very supportive to ensure that the requisite due diligence was done in a timely manner. The higher rating for implementation reflects the fact that the sector risks would weigh heavier on the overall sustainability of results through their potential impact on LEC’s financials. | | | | | **Comments:** Section to be removed when the PAD is sent to the Board for approvalThe rating for implementation reflects the fact that the sector risks would weigh heavier on the overall sustainability of results through their potential impact on LEC’s financials. | | | | | | | | | |
| 1. **Risk Team** | | | | | | | | | | | | | | | | |
| * 1. **Preparation Risk Rating** Section to be removed when the PAD is sent to the Board for approval | | | | | **6.2 Implementation Risk Rating** Section to be removed when the PAD is sent to the Board for approval | | | | | | | | | | | |
| **Comments:**  Section to be removed when the PAD is sent to the Board for approval | | | | | **Comments:** Section to be removed when the PAD is sent to the Board for approval | | | | | | | | | | | |
| 1. **Overall Risk Following Review** | | | | | | | | | | | | | | | | |
| * 1. **Preparation Risk Rating:** Section to be removed when the PAD is sent to the Board for approval | | | | | **7.2 Implementation Risk Rating:** | | | | | | | | | | | |
| **Comments:** | | | | | **Comments:** | | | | | | | | | | | |

Note : Include on average no more than 3 Risk Management Measures per Risk Category

# Annex 3: Detailed Description of Modified or New Project Activities

1. **General description for new project activities aiming at closing the financial gap and scaling up existing components.** The original project has four major components that aim at increasing access to electricity services by improving the distribution network and enhancing associated facilities for power generation. The IDA credit additional financing is earmarked for financing additional activities under *Component A. Distribution services* and *Component B. Enhancing options for power generation*. Co-financing from the Global Environment Facility (GEF) is proposed for scaling up *Component C. Providing modern renewable energy for off-grid users,* for which a separate account will be established. The co-financing will allow for scaling up the AFREA-supported pilot activities, which to date have facilitated the rehabilitation of a micro-hydropower plant and implementation of a sustainable solar market facilitation effort. The GEF-supported effort will comprise a solar lantern exchange program; details are provided in Annex 4.
2. The proposed Additional Financing will support expanded project activities that scale up the project’s program to enhance the project’s development impact in a cost effective manner. The scaled-up project activities are an expansion of similar, ongoing activities in the on-grid system as follows:

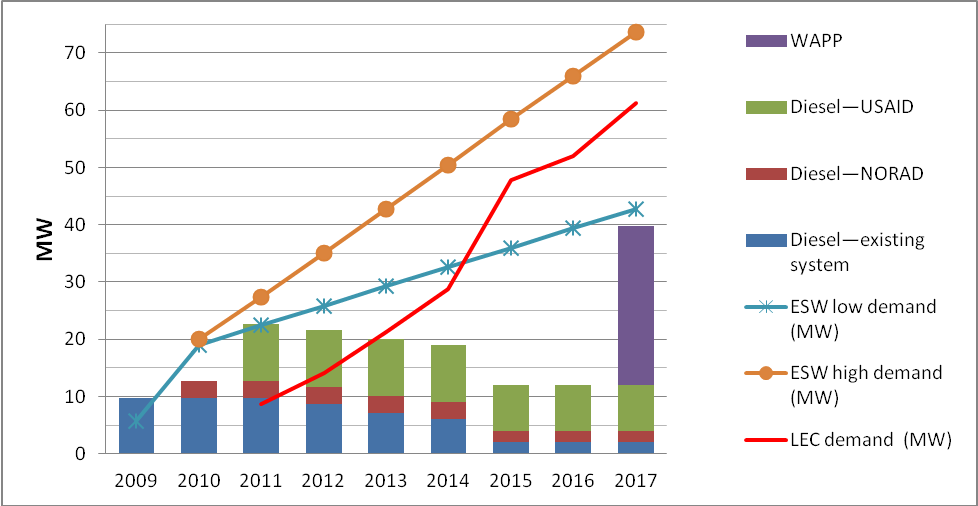
**Sub-component A: Distribution network reinforcement and extension (US$3.8 million original with an additional financing of US$ 3million)**.

1. Progress to rehabilitate and expand the nascent power system in Liberia has been made through the first year of the Management Contractor. The system is currently composed of 23 MW installed capacity in services with high speed diesel units compared with 9.7 MW in June, 2010. A 66 kV sub-transmission line tying all four generation facility centers are completed and significant progress on construction the distribution lines at 22 kV has been achieved allowing for the connection of new customers. The customer base has increased 88 percent from 4,659 customers in July 2011 compared with 2,469 customers in July 2010.
2. The objective of this activity is to reinforce and upgrade the medium voltage distribution grid in order to be able to deliver the additional power from LEC, including the required equipment to establish proper communications and synchronization capabilities of the system. Additional generation capacity has to be coordinated with proper design and expansion of the medium voltage distribution network in place. This will ensure that additional capacity can be efficiently absorbed and dispatched by the system while increasing the consumer based in the on-grid system in Monrovia.
3. This component will support the detail characteristics of the upgrades that will be necessary in order to deliver the additional power to LEC’s transmission and distribution system, as well as the financing of the equipment identified. First, an evaluation of the system and recommendation will take place for upgrading the control and communications systems for LEC’s generation, transmission and distribution to provide for safe and efficient operation, control and protection. The evaluation of systems will consider the need for optimal dispatch of existing and planned generation and the need to accommodate the associated expansion of LEC’s transmission and distribution systems including the eventual interconnection with WAPP and the Mount Coffee power generation (reconstruction of 66MW hydropower plan). The detail control and communications system will be financed through this component.
4. With the rebuilding of LEC underway and the availability of substantial resources to continue this process, it is expected that LEC will emerge from an emergency response model and begin the transition to a well managed utility with lower costs, more sustainable generation and more effective means to control and optimize system expansion and operations. The additional financial resources now available to LEC will allow LEC to accelerate the supply of lower cost and reliable power and to reduce the unserved demand in Monrovia.

**Component B: Enhancing options for power generation (US$4.7 million financed by IDA originally with an additional financing of US$16 million)**

1. The design and needs of the additional financing requirements of the Project derives directly from the recommendation contained in the Energy Sector Policy Note developed by the World Bank in 2010[[8]](#footnote-8) and recently echoed by the Electric Master Plan prepared by LEC under the Management Contractor. Accordingly to the World Bank Policy Note, the committed power in the timeframe of 2009 to 2015 would leave a gap in the supply-demand balance starting from 2012 (see Figure 1). The emerging gap increases from about 4 MW in 2012 to about 13 MW in 2014. Only in 2015, when the WAPP CLSG comes online, the gap can be bridged. According to the report, among those options that are available by 2012, Heavy Fuel Oil (HFO) is least cost.
2. In Figure 1 presents only the power supply options that are currently in operation and those for which there is a certainty for their implementation based on available funding. This implies that only existing, NORAD and USAID-financed diesel power plant are dispatched. Additional power is envisaged to be available through the WAPP CSLG transmission project for which preparation is well underway, and which is estimated to come online in 2015. At the same time, it has to be assumed that the installed diesel generators will wear out in advance of their expected lifetime, and thus supply from these units would slowly decline until 2015.

**Figure 1: Supply-Demand forecast for the medium-term 2010-2015**



1. Similarly, a Master Plan for generation expansion and build-out of the transmission and distribution system has been prepared by LEC. This plan recognizes that, as a result of the very large unserved demand in Monrovia, the rate of load growth in the near term will be constrained by the ability to finance the rebuilding of LEC’s generation, transmission and distribution systems. Under the base case scenario, a peak demand of about 48 MW is forecast by June 2015. This scenario is still a constrained demand forecast because of limitations on available funding for generation capacity additions and T & D build out. Urban access is projected to reach 14% at that time, up from less than 0.3% today forecast because of limitations on available funding for generation capacity additions and transmission and distribution. Urban access is projected to reach 14% at that time, however this is still short compared with the 30 percent target in the National Energy Policy.
2. The Master Plan also indicates that the current load factor on the existing Monrovia system is approximately 70%. Therefore the average demand for each customer class, (including a breakdown of residential customers by income), was adjusted by a factor of 0.7 to determine the peak demand that could be expected from each customer grouping in preparing the forecast. Under this assumption, the peak demand explained above is calculated.
3. In the case of any funding limitations and adequate generation capacity, peak demand could reach 75 MW by 2015 and 202 MW by 2030. Another 45,000 customers could be connected by 2015 increasing urban access to 27%. By 2030 urban access could exceed 40% with another 136,000 customers connected at an additional estimated transmission and distribution cost of US$100 million.
4. In order to address the supply generation gap, commitments on generation are underway but the might be implemented after 2015, they are composed of:
   1. 10 MW of HFO-fuel fired generation plan supported by JICA funding. This project has been delayed and is now expected to be in service about end of 2014.
   2. Regional transmission line as part of the West African Power Pool (WAPP) that will interconnect Cote d’Ivoire, Liberia, Sierra Leon, Guinea (CLSG) that will initially provide access to 18 MW of generation from neighboring countries.
   3. Reconstruction of the Mt Coffee Hydroelectric project which is expected to provide the primary source of low cost energy for Monrovia for the foreseeable future. The project, which will require around four years to implement, is expected to provide in excess of 66 MW of capacity in the wet season but only limited firm capacity in the dry season of around 9 to 10MW.

In general, the studies above mentioned concluded that by 2013 at the latest about 10 MW of generation capacity will be missing to meet the demand as indicated during the preparation of the LESEP last year. Against the background of a status of continued emergency in the power sector, which is putting the just gained social stability at risk, closing that gap is imperative. Based on current generation expansion plans and the expected load characteristics, it is expected that the most economic generation stacking would involve: (i) 10 MW HFO-fired generation plant and the importation of up to 18 MW of power from the WAPP transmission line to supply base and possibly shoulder loads; and (ii) use of the high speed diesel generation for peaking and, as the system load increases, for some portion of the shoulder loads. In the mid-term, Mount Coffee hydropower generation will supply the lower electricity cost, however, there is still a need for thermal power generation to compensate the seasonal fluctuations of the Saint Paul River.

1. In terms of potential beneficiaries, this component will support the availability of LEC to meet part of the demand that is expected to increase the residential base. On one hand this component provides the means for increasing supply availability and enhancement of the distribution network to increase and reach new customers. On the other hand, as part of the LESEP package, GPOBA is providing financing for the connection of 16,000 poor and low income households. Table 1 presents the evolution of LEC on increasing new connections and its shows a growth on the residential customers from 39 percent in July 2010 to 47 percent in July 2011. Existing residential customers are further broken down into kWh consumption ranges considered to be reasonably representative of income levels and the distribution is as follows: 26 percent poor, 35 percent low income, 20.6 percent middle income, 13 percent upper income, and 5.4 percent high income.

Table 1. LEC Customer base evolution.

|  |  |  |  |
| --- | --- | --- | --- |
| **Customer Breakdown:** | **Jul-10** | **Jan-11** | **Jul-11** |
| Residential | 1004 | 1,177 | 2435 |
| Commercial and Small Industrial | 1038 | 1,207 | 2071 |
| Government Of Liberia | 96 | 97 | 104 |
| Non-Governmental Organization | 19 | 20 | 32 |
| Public Corporation | 7 | 6 | 5 |
| Liberia Electricity Corporation | 7 | 7 | 8 |
| Tax Exempt | 1 | 2 | 2 |
| Prepaid Customers Agents | 2 | 2 | 2 |
| **Total** | **2,518** | **2,518** | **2,518** |

1. As part of the Electric Master Plan conducted by the management contractor, a total of 49 areas or communities were identified and mapped using GPS coordinates to show the locations of existing distribution lines and green-field electrification areas requiring new feeders and in some cases the addition of substations fed from the existing or expanded 66kV system. In this regard, LEC will extend service to areas of new formal housing developments and informal settlements that have in recent years experienced significant population growth which some of poor and low-income household are established.
2. The proposed component, therefore, will support the procurement of 10MW of thermal generation to match projected load growth and to provide adequate system reliability. The component will also provide an analysis through a feasibility study between the options of HFO-fired power generation and medium speed dual diesel power generation in order to identify the comparative financial gains and considering the progress made by the GoL regarding the implementation of handling and storage of HFO so LEC is to be able to secured HFO-fired power plant.
3. **Environmental aspects**. In conjunction with the selection of the most appropriate technologies for new generation and associated works, LEC has initiated preparative work for to address the environmental and social issues. In this regard, the Environmental and Social Management Framework (ESMF) and the Resettlement Policy Framework (RPF) have been prepared and disclosed. These frameworks set out the actions for the overall sector and in particular for the activities included in the original project. They were disclosed to Infoshop on September 14, 2010. With regard to the new investments (thermal power generation plant and fuel storage and fuel pipeline), proposed to be financed under the Additional Financing, a specific Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) would be required. LESEP is currently in the process of preparing the request for proposals to recruit consultants to support the carrying out of these assessments and preparation of the necessary plans. It is envisaged that the environmental mitigation plan and RAP would be ready for disclosure by April 2012.

**Implementation Arrangements**

1. The additional financing will follow the same implementation arrangements as the original project. For the above mentioned components, LEC is the implementation agency and will responsible for the execution of Components A and C. Under this contract management contract, LEC is benefiting from MC’s expertise and MHI assumes full management responsibility. The project will rely on the institutional and legal agreement already in place for the implementation of the project. This will help reduce the institutional and transaction costs associated with this project.
2. The Results Framework under the project will be monitored by the implementing agencies of the various components. Results will be submitted to the MLME for aggregation of results and reporting of these to the World Bank. For components A and B, LEC will undertake this reporting. Under the management contract, LEC has shown a good capacity in reporting these indicators through the monthly reports and through the capacity building.
3. A project coordinator has been appointed and will report to the Chief Executive Officer of LEC. The project coordinator is supported by an accountant, a procurement staff, and an environmental and social focal point currently working under LEC structure.

# Annex 4: GEF Co-Financing for Component C:

# Providing Modern Renewable Energy Services to Off-Grid Users

**Background**

1. The rate of access to the national electric grid is effectively 0%, with 1.5% of Monrovia’s population having access. Against this background, Liberia’s National Energy Policy (NEP) calls for electrifying 15% of rural Liberia and 30% of the country’s urban and peri-urban areas by 2015. The NEP also calls for Liberia to be carbon neutral by 2050. However, the financing available for scaling up Liberia’s rural access agenda is far from what is needed to achieve Liberia’s policy objectives. With its high capital cost in excess of US$1000 per customer even in Liberia’s capital Monrovia, the extension of the electrical grid to all people of Liberia will not be realized for many years into the future. To achieve access to modern energy services earlier, programs in Liberia need to be based on innovative approaches that use cutting edge, affordable technologies.
2. This GEF-financed component proposes to introduce modern Light Emitting Diode (LED) devices, which are powered by renewable sources (mainly solar power) into Liberia’s market for lighting products. It inscribes itself thereby in the World Bank/IFC Lighting Africa program, which supports the commercial introduction and market scale-up of quality off-grid lighting products and is helping to develop off-grid lighting markets in Sub-Saharan Africa. Lighting Africa is mobilizing the private sector to build sustainable markets to provide safe, affordable, and modern off-grid lighting to 2.5 million people in Africa by 2012 and to 250 million people by 2030. Since 2010, close to 1.5 million people in Africa have cleaner, safer, better lighting and improved energy access because of the program.[[9]](#footnote-9)
3. The Lighting Lives in Liberia program, based on the private sector platform of Lighting Africa, could reach one-third of the countryside in a short amount of time (eventually one million lives or 200,000 households), resulting in a highly visible, quick impact delivery of improved lighting and micro-systems to households, including in the country’s most neglected counties.
4. The proposed co-financing is intended to scale up LESEP *Component C:* *Providing modern renewable energy services to off-grid users*. In March 2011, the Government of Liberia requested a grant of $1,454,540 from the Global Environment Facility (GEF) for the launch of the Lighting Africa program in Liberia, which would primarily comprise a solar lantern exchange program entitled “Lighting lives in Liberia.” The grant is intended to catalyze private businesses to market and sell, on a large scale, solar lanterns using advanced LED and efficient CFL technologies to displace kerosene and other inefficient or fuel-based lighting, while improving the capacity of the Rural and Renewable Energy Agency (RREA) and the private sector, to ultimately reach a goal of serving 200,000 households or benefitting one million Liberian lives. The co-financing has been approved by the GEF CEO and the GEF Council, as of September 18 and November 9, respectively.

**Incremental Costs**

1. A 2011 national Willingness to Pay study conducted in Liberia with GPOBA support found that on average rural (non-Monrovia) Liberian consumers spend US$19.84 per month on energy, which ranges from $8.48 at the poorest quartile to $34.28 at the highest. Of this, an average of $7.01 per month is spent on lighting alone, which ranges from $4.50 to $8.79. Overall, energy expenditures account for about 11% of Liberian rural household expenditures, with the poorest households expending more on energy, as a percentage of total household expenditures, than other households in higher income brackets.
2. For lighting, the majority of households surveyed (64%) depend on one or more types of battery-operated lights, which range from small torches containing 1–5 LED bulbs to complex LED lamps containing 15 or more LED bulbs. The average costs of such lights range from US$1.00–7.00, and due to their low quality they must be replaced every few weeks to months. With the additional cost of disposable batteries, which are typically also low quality, the expenditures on battery-powered lighting equate to $10.43/kWh for the appliances and $1.61/kWh for the batteries.[[10]](#footnote-10)
3. The survey found that today, only about 10% of Liberians depend on kerosene for lighting. This reflects a recent trend caused by (i) the widespread availability of cheap, battery-powered LED lights; (ii) the relative brightness of LEDs compared to kerosene; and (iii) and rising costs of kerosene coupled with lower availability in rural areas. In addition, the relatively commonplace occurrence of household fires caused by kerosene and candles has provided a market pull. Households still using kerosene spend approximately US$6.80 per month, which equates to about $18.00/kWh. The remainder of households that participated in the WTP analysis used on electric bulbs, powered by small petrol or diesel generator; candles, or homemade palm oil lamps.
4. Given the current amount of household expenditures put toward lighting, and the trend of consumer preferences moving from kerosene to LED lights, the introduction of high-quality, low-cost, solar powered lights is promising for Liberia. The availability of high-quality solar-powered lights could displace 75% of current household energy expenditures on inferior sources of lighting, leaving this income available for other uses.
5. In addition to lighting, households typically spend $5–15 per month to charge cell phones at diesel-powered booths (about $0.60 per phone per charge). With many of the Lighting Africa approved lights also providing a cell phone charging capability, households will have the opportunity to save additional income at this same rate. In fact, the price point of the “budget” Lighting Africa approved products equals not much more than the average household expenditure of lighting and phone charging combined. These potential savings would significantly improve the quality of life of off-grid households, and make increasing service levels of high-quality products more affordable over time. In this way, households can climb the energy ladder from dependence on the smallest appliances to thriving with micro home systems.
6. Typically the individual lights and lighting packages supported under Lighting Africa are priced between US$25–150 in relatively mature markets such as Kenya. This translates into a cost of electricity of US$1.49 - 5.21 range per kWh. This suggests that the support from the GEF program, which focuses on the barriers of product entry into the Liberian market, should translate into a rapid adoption of these products once they are known to the consumers.
7. The below Table 1 shows the incremental cost of the project. It provides an analysis of the impact of GEF funding that will be put toward the solar lighting technology directly, which represents nearly 80% of the grant investment.

**Table 1. Incremental Costs of GEF Contribution**

|  |  |
| --- | --- |
| GEF grant for purchase of solar lanterns | $1,124,540 |
| Estimated cost for 100,000 budget solar lights (delivered to Monrovia) | $2,500,000 |
| Retail cost per lantern (estimated based on current cost of budget-level Lighting Africa products) | $30 |
| GEF grant per lantern | $11 |
| Net cost/lantern (to be paid by private sector/ consumers) | $19 |

**Rationale for Intervention**

1. By utilizing the tools of the Lighting Africa program and the foundation of the AFREA support program to the RREA, the Lighting Lives in Liberia approach is designed to address the failure of many previous solar PV projects and programs, such as those implemented in Liberia to date, which have been entirely donor driven and financed, with inadequate mechanisms put in place for long-term sustainability. Such programs have not established workable solutions for rural communities, and have not adequately addressed the relatively high cost of conventional solar technology or the complexities associated with small-scale and dispersed rural markets. Many of the systems installed only a few years ago have fallen into disrepair or have been sold-on. This is why the proposed approach is designed as a public-private partnership, as both sectors are necessary for initial traction and long-term sustainability.
2. In new markets, such as Liberia's, demand and willingness to pay for higher performing lighting products are yet uncertain. Firms that may want to get into business to supply such products in Liberia face multiple challenges and uncertainties that, for the consumers, limit product availability and/or raise prices:

* Access to information is limited or is lacking entirely;
* Duty and tax structures are not prohibitive, but could be improved;
* Port clearing procedures are costly and time-consuming, and lack transparency;
* Consumer confidence is low or non-existent, making it unlikely that households will spend scarce resources on what are perceived as expensive lighting sources;
* Transactions costs will be higher as firms are reluctant to import and stock these items in cost-effective quantities and set up the infrastructure to sell and service them until market demand is proven. Firms would be purchasing products at smaller volumes and from secondary distributors in near-by countries and they may demand a higher risk premium for stocking these products.
* Many firms lack the trade finance to import products in sufficient quantities, due to the requirement to pay 100% of the order cost before shipment.

1. Consequently, retail prices would be higher and supply and service networks less established, thus deterring consumers from purchasing and maintaining these products. Consumers may continue to buy low quality off-grid electric lights that use disposable batteries due to their lower first cost and familiarity. Such products are currently flooding the Liberian market. While such products are low cost initially, their life may be one week to a few months and they use disposable dry cell batteries whose costs add up hugely over time and whose disposal harms the environment. The proposed program aims at tackling the above identified market barriers.

**Project Development Objective and Project Components**

1. The project development objective (PDO) is the same as the IDA project, namely *to improve and increase access to electricity* in Liberia.
2. The global environmental objective of this GEF-financed component of the project is *to reduce greenhouse gas emissions when compared with Liberia's emissions growth baseline*, and thus to contribute to mitigating climate change. The greenhouse gas emissions from kerosene and disposable batteries will be reduced by the program, resulting in a direct offset of about 335,000 tons of CO2 emissions over the lifetime of the “Lighting Africa” products.
3. The proposed GEF component will seed the off-grid lighting market through a lantern exchange program, which would include supporting commercial marketing and sales of about 100,000 solar lights while removing an equal number of polluting and low-quality lanterns and products (including disposable battery-powered lights and kerosene) from household use. The GEF component effectively creates is a revolving working capital fund, utilizing incoming payments from retail partners to import additional products and further support the expansion of the market.
4. The envisaged lantern sales are intended to be enabled through the following mechanisms: (i) subsidizing the import of the products, so that they can be sold at wholesale cost. Subsidies will be phased out by the end of the program to ensure full commercial sustainability; (ii) provision of trade finance to vetted retailers, so that they can afford to enter the off-grid lighting market in the absence of favorable lending terms from commercial banks; (iii) business support to these same retailers, in the areas of technical training and consumer outreach; (iv) consumer education on solar lighting products, the Lighting Africa program, and the availability of discounts for surrendered working kerosene or low-quality battery-powered lights; (v) putting the market entry risk on the public sector (RREA), so that products can enter Liberia’s market and consumers gain familiarity; and (vi) working with government stakeholders to improve the policy and regulatory environment to help lower the barriers to business development. The below figure shows the product, financial, service, and technical assistance flows of the GEF program.

**Figure 1: Interaction of Stakeholders under the Lighting Lives Program**



1. **The role of women in making choices for lighting devices:** women and men alike stand to benefit greatly from better lighting and energy access. Entrepreneurial women, like men, have a particular stake, since modern lighting and communications technology enable them to strengthen their enterprises. However, tailored approaches that offer a range of lighting options for different contexts and needs are warranted. The types of businesses women and men operate shape their lighting preferences. Women also have specific concerns when purchasing lighting: in particular, health concerns (e.g. indoor pollution for children, and burns) are observed to be more a consideration for women than for men in choosing lighting alternatives. Finally, women’s access to financing can differ from that of men, tending to be informal.
2. In the context of access to energy and lighting, the aim is to identify whether there are any women-specific opportunities in the off-grid lighting market that could enhance product profitability while also improving lives. The proposed project will seek to build such opportunities and strengthen the role of women in the off-grid lighting market. For instance, it is anticipated that Liberia’s market women’s network would be involved in the proposed activities as a retail partner.
3. **Project structure.** The Lighting Lives in Liberia project is composed of three components. Component 1 provides for the enabling framework of the project, Component 2 is dedicated t piloting the “Lighting Africa” products in Liberia, and Component 3 is for project management. Table 2 below gives the financing breakdown by component and gives an overview of the expected project outcomes.

**Table 2: Project by Components and Expected Project Outcomes**

|  |  |  |  |
| --- | --- | --- | --- |
| **Project Components** | **Expected Outcomes** | **Financing from GEF**  **(US$)** | **Co-financing**  **(US$)** |
| **Component 1:** Creation of an enabling market environment for “Lighting Africa” lighting products. | (a) Capacity of RREA and private sector built.  (b) Access to sustainable energy rapidly increased.  (c) Access to improved lighting services offered.  (d) Policies and regulations adopted to support market facilitation and quality standards for off-grid lighting services. | 200,000 | 1,650,000 |
| **Component 2:** “Lighting Liberia” - business development for use of solar energy for rapid scale-up of access to modern lighting. | (a.) Quality solar lanterns demonstrated and promoted in Liberia  (b.) Conditions for commercial market expansion for modern high quality solar lights created  (c.) Dissemination of at least 100,000 high-quality solar lanterns  (d.) Reduced GHG emissions from kerosene of about 15% from the current baseline and direct offset of about 335,000 tons of CO2 emissions over three years. | 1,124,540 | 2,150,000 |
| **Component 3:** Project management | Under this component, the project management is being ensured. | 130,000 | 250,000 |
| **Total** | | **1,454,540** | **4,050,000** |

**Component 1: Creation of an Enabling Market Environment for “Lighting Africa” lighting products**

1. Under this component an enabling framework for the sale of “Lighting Africa” approved technologies is being put in place. It will focus on the development of institutional capacity, policy and regulation, market facilitation, and quality standards. Among others, this Component includes the following activities:
2. Market assessment. A market assessment will be carried out to fully determine the potential of the market for modern off-grid lighting devices, to assess and prioritize the needs of the market, and to evaluate the viability of a sustainable commercial solution. Specifically, the survey will map out the current supply chains and delivery mechanisms for traditional lighting sources (e.g. kerosene) as well as newer technologies (e.g. disposable battery-powered LED lights), and will cover Monrovia as well as the interior counties.

**Market and Consumer Outreach Activities**

Above the line:

1. Newspaper advertisements: Display pictures and suggested retail prices of LA-approved products, along with statements and pictures depicting benefits of solar lighting and details of program. Pictures of LA products serve as a de facto “quality seal.”
2. Radio advertisements: Short spots announcing the program, and longer live discussion sessions on details and benefits of the program and products.
3. SMS messages which state, e.g., “text xxxxx for information on how to obtain a high-quality solar light” and send back a high-level reply (in partnership with cell phone companies).
4. Corporate outreach: targeting concessions, plantations, large companies (e.g. cell phones), commercial banks/MFIs, etc.

Below the line:

1. Road shows in areas where retailers have a presence: including social and trade group forums—high intensity, visibility, and impact on market days; poster campaign; door-to-door consumer engagement
2. Village-level entrepreneur drive (in consultation with distributors/retailers)

Evaluation:

1. Registration of each customer in shared RREA/retailer database (name, location, cell #), for follow-up/M&E.
2. Policy and business environment study. This study would include (i) evaluation of current barriers to starting or expanding a renewable energy or off-grid lighting business, such as the processes that are required for registration and import licenses, taxes, and customs procedures; (ii) evaluation of the financial and time cost of importing products, including custom and duty tariffs, port clearing fees, and other fee requirements encountered in the process; (iii) identification of any distorting subsidies from traditional fuels; (iv) regulatory standards for energy services, including tariffs and consumer protections, and products, including for batteries, light bulbs, LED torches and lamps, and solar lamps and other components; and (v) coordination mechanisms between institutions regarding energy policy, grid and off-grid areas. In particular, the study would propose methods for addressing the key barriers found in Liberia, to include establishing a standards program for all lighting products. The study will also provide recommendations to the government on policy and regulatory actions that should create a better enabling environment for clean off-grid lighting.
3. Marketing support and consumer outreach. RREA will assist participating retailers to build their marketing and sales capacity. RREA will also conduct promotional programs (e.g. radio, newspaper and other print/flyer advertising) to inform consumers about the benefits of Lighting Africa approved modern off-grid lighting products over inferior products available on the market, and to build their confidence in the products. RREA will also assist retailers in carrying out a road show once products have arrived in country, as a hands-on outreach effort for off-grid consumers. Finally, RREA will assist in training retailers as well as service center staff of the retailers in servicing/repairing such products (in close coordination with LA manufacturers). The key market and outreach activities are shown in the box above. During the phase of product dissemination, the road shows will play a particularly important role to ensure sales.[[11]](#footnote-11)
4. Market Development Support Facility. As demand dictates, RREA will provide matching grant assistance to participating companies to improve their business and market development capabilities. The RREA would cover up to 75 percent of the cost of eligible services (cost-share not to exceed US$37,500). Eligible services/expenditures would include:

* Market development activities—market and consumer surveys, training of marketing staff or sales agents, design and production of promotional materials, marketing and advertising, participation in promotional events.
* Business improvement activities—staff training, business plan preparation, financial or other systems development.

Ineligible expenses would include salaries or other expenses of company/network staff, consultants, or government officials, and any costs associated with the routine business activities of the company/network.

1. Training. Concurrent with the sale of the lights, the RREA will carry out training of retailers and their representatives in rural areas, to ensure any technical issues with the lights are promptly resolved, and spare batteries are available locally. The manufacturers of the lights are expected to contribute to technical training initially, and from there the training activity will follow the “train the trainer” approach. Learning the “sales pitch” of the products will also be part of the training.

**Component 2: “Lighting Liberia” - business development for use of solar energy for rapid scale-up of access to modern lighting**

1. Under this component, eligible retailers will sell “Lighting Africa” approved products, and collect the lighting products they replace, such as kerosene lanterns and battery-powered lanterns. The different steps of this activity are summarized in the below.
2. Step 1: Competitive selection of retailers. An invitation for expressions of interest (EOI) will be released by the RREA in local papers and on the Web sites of relevant GOL entities, which calls for the proposals of interested potential retail partners to participate in a pilot program making subsidized but commercial sales of sustainable off-grid lighting products to Liberians, including in rural areas. Partners would receive business facilitation support. These retail partners may include firms and their dealers that supply mobile phones, phone charging services and/or scratch cards; kerosene, light bulb, and battery-powered lighting retail outlets; women’s market networks; consumer durable goods suppliers that stock/sell goods of comparable price (e.g. US$15-60); or other local firms currently involved in renewable energy or improved lighting product sales that may need a boost to expand their operations.
3. These “retailers” could also include NGOs, micro-finance organizations, or faith-based organizations that have a national or semi-national presence and currently deliver goods, such as agricultural inputs, to Liberia’s population, on the condition that the organization have a plan for future commercial transition and/or scale-up. Up to five retailers/networks would be selected for participation. Prior to release of the EOI, the RREA will reach out to retailers that would be suitable or have expressed preliminary interest, in order to solicit their feedback and confirm program details; the Liberian Business Association (LIBA) will also be briefed on the activity for the information of its members. The RREA will be responsible for evaluating the response to the EOI and short-listing the most qualified bidders, who will then be invited to submit full proposals to participate in the project.
4. Participating retailers are required to meet certain conditions, including: offering products for sale at reasonable trade margins (to be approved by RREA), honoring warranties, providing honest and complete information to customers regarding the products and the services they offer, making their staff available to receive training, making timely payments to RREA after consignment sales are made, making sales in the interior counties, providing after-sales services in the geographic area of sales, and providing accurate and timely reports to RREA on sales and sales prices and any issues they may have encountered. In addition, commercial retail partners must pay tax on the profits made from sale of the lights.
5. Step 2: Introduction of Lighting Africa suppliers and products. Following release of the EOI and short-listing of potential partners, Lighting Africa manufacturers of approved products estimated to be of budget (≤$15 FOB) or mid-range (US$16–30 FOB) price level will be invited to Liberia by the RREA to meet interested bidders in a pre-bid informational session, where the manufacturers will demonstrate products, answer questions, and evaluate suitability of potential distributors in one-on-one meetings. Following this pre-bid event, the short-listed retailers/networks will submit proposals for inclusion in the program. Proposals will be evaluated per the program criteria, and up to five retailers/networks will be selected.
6. Step 3: Pilot order. Each selected retail partner will decide which product(s) they want to sell, and what quantity they are capable of selling. RREA will aggregate orders from participating firms and place orders on their behalf for Lighting Africa approved products, following the direct contracting procurement method.[[12]](#footnote-12) This is meant as an initial market test, to be followed soon after by the full lantern exchange program. Approximately 5,000 lighting products are proposed to be made available to consumers through this pilot program. Legal agreements between the RREA and the retail partners will have to be concluded.
7. The RREA will make these products available to the participating retailers at their freight-on-board (FOB—wholesale) price. The insurance, freight, any payable duties and taxes, customs clearing, inspection, and warehousing charges will be borne by RREA.[[13]](#footnote-13) As this is a market testing program, the lights will be provided to retailers for a down payment (e.g. 50%—to be determined in consultation with selected retail partners), with the balance due upon retail sale of the lighting products. This is because the average local retailer does not have the capital to pay for 100% of product cost up-front. Retailers will use their own networks to sell these products, and must include sales outside of Monrovia in at least two counties (sales in Monrovia are also permitted). Sales may be for cash, installment payments or with micro-finance loans, as decided by the retailers.
8. Step 4: GEF Program Order. Following the pilot phase and based on the lessons learned during this phase, the main phase would be started. The RREA will assist retail partners to finalize their business plans to ensure that their operations will be sustainable after donor support ends. The retail partners should have a better idea at this stage, following the completion of the pilot sales phase, of what their realistic capital and recurring costs will be. An accurate valuation prior to scale-up is critical, to ensure retail partners will be able to provide after-sales service at the level required by the program on a long-term and fully commercial basis.
9. Against this background, the RREA will finalize the full-scale program and prepare for launch. This will require signing new legally-binding agreements with retail partners, as well as ensuring that the RREA and retail partners are in agreement on the terms of the full-scale program — e.g., the quantity of lights to be taken per down-payment tranche, and the time allowed for the sale of that tranche.
10. Once the overall quantity of lights has been determined in consultation with each retail partner, the RREA will devise a schedule for that retailer showing how many lights will be released at a specific time, and how much time the retail partner will be allowed for sales before they are required to return and pay the remainder of the FOB product cost. Orders of the Lighting Africa approved lights will be placed by the RREA following the direct contracting method as described above. It is expected that, as during the pilot phase, lights would be procured from more than one supplier and in batches, the quantity of which will be based on the sales ability of the retail partners.
11. The retail partners will be supervised closely by RREA staff and their consultants throughout the process, to ensure the profit margins set on the products are in accordance with the goals of the program, that retail partners are providing technical training adequately and correctly, and that after-sales service is being offered, including any instances of upholding warranties.
12. Step 5: Lantern exchange. In order to remove the old lamps from the system and ensure that greenhouse gas emissions are de facto reduced, a lantern exchange program is envisaged. It is based on the notion that handing in a working kerosene lamp or battery-powered low-quality light will result in a discount for a new “Lighting Africa” approved solar light. Initially, a discount of between 25-33% is being suggested. The amount of the discount is to be revised following the pilot phase. The mechanism for the lantern exchange is as follows:

* Retail partner picks up x number of solar lights, pays RREA x percentage of FOB cost.
* Retail partner sets retail price, makes sale; accepts working kerosene lamp from consumer, and sells solar light minus x percent of retail price in exchange.
* Retail partner returns the kerosene lamp to the RREA.
* RREA reimburses retailer for the amount of the exchange discount (x percent of retail price).
* Retailer retains original profit margin. RREA retains x amount to recycle into further purchases.

The below figure gives an example of how the money flow would work, using indicative figures.[[14]](#footnote-14)

**Figure 2: The mechanics of the lantern exchange program**



1. Step 6: Revolving Fund. Funds paid and returned to the RREA by retailers from the sale of Lighting Africa products will be deposited into the Rural Energy Fund (REFund), which is designed to provide project development support by competitive application. During the project, the funds will be recycled in a project-specific account to enable bulk purchase of additional Lighting Africa products until the goal of 100,000 lanterns is reached. Following the close of the GEF program, the remaining funds will be made available to similar projects through the formally established procedures of the REFund, which are intended to catalyze further expansion of renewable energy access in Liberia through competitive selection of community, NGO, or private sector rural electrification and energy access projects.

**Component 3: Project management**

1. The project management will be conducted by the RREA. Please refer to the section below on implementation arrangements.

**Monitoring and evaluation**

1. The RREA will monitor implementation and conduct consumer surveys to assess market response and to evaluate the success of the program. Cell phone numbers of customers as well as other identity details will be recorded by retailers upon sale. These will be sampled randomly by the RREA to carry out the M&E.
2. Indicators to be monitored include (a) number of lights sold per retailer, and the geographic distribution of the sales; (b) retail price of products sold by each retailer; (c) speed of sales; (d) customer satisfaction with the products after a few months of use, and any problems encountered; (e) availability of after-sales support in sale areas, including any warranty or technical issues; and (f) self-evaluation of retailers regarding the success of the pilot sale phase and their subsequent financial health.
3. In addition, the RREA will identify after-sales service issues, policy barriers, and transactional bottlenecks that impede the flow and sustainability of these high-quality products into the Liberian market. Approaches to overcoming the problems encountered will be devised for incorporation into the ongoing program.
4. In order to accurately track sales, the RREA will work together with retailers to create a database recording the customers who have purchased lights, including their name, address/location, and cell phone number. This will allow for monitoring and evaluation during and after the pilot phase, as well as enable the retail partner to provide remote after-sales service if needed (e.g. warranty questions).
5. Monitoring and evaluation activities are mapped under the TA component of the project, with a budget of $25,000 which will cover travel. Staff time of the implementing agency for carrying out M&E is costed elsewhere (program management, Government co-financing).

**Implementation Arrangements and Stakeholders**

1. The GEF Grant will be implemented by Liberia’s Rural and Renewable Energy Agency (RREA), which is under the policy direction of the Ministry of Lands, Mines and Energy. The RREA is the first agency of its kind in the history of Liberia, and its establishment reflects the emphasis put on rural energy access as well as environmental sustainability in Liberia’s National Energy Policy (NEP). Rather than setting up a dedicated Project Implementation Unit, the project will be mainstreamed into the normal operations of the RREA. The RREA will appoint a dedicated project manager. The RREA is also the key stakeholder in the sense that the objectives of the project are tailored to the RREA’s mandate, and will help the RREA to achieve a significant percentage of its rural access goals under Liberia’s Poverty Reduction Strategy. Figure 3 shows the organigram of the RREA.
2. In addition, the private sector will be a key stakeholder, as the Lighting Liberia program will work with the toolkits and products from the current Lighting Africa program and adapt them to Liberian requirements and conditions to increase market intelligence, consumer awareness, and improved affordability of high-quality solar products. Consumers are the ultimate beneficiaries of the investment activities of the proposed project, as the project will support the introduction of low-cost, sustainable, and quality assured products to a market that currently pays exorbitant prices for low-tech and low efficiency products that are damaging to the environment and especially to the health of women and children (e.g. disposable batteries, kerosene breathed indoors).

**Figure 3: The RREA’s Organigram**

RREA Board of Directors

RREA Executive Director

Director of Finance

Director of Administration and Operations

Director of Programs

Director of Technical Services

Accountant

Director of Procurement

Office Assistants/

Drivers

Security

Energy, Gender and Development Officer

Procurement Assistant

Dedicated Project Managers (2)

**Key Project Risks**

1. There are several risks to the project’s success.

* **Reputational issues:** There is a risk of lack of interest in the new product due to the entry of poor quality solar lighting products into the marketplace, and that may hurt the reputation of solar lights. To counter this risk, the RREA will adopt “Lighting Africa” quality standards and ensure products supported under the program meets these standards. Information campaigns will also educate potential customers on how to recognize quality products. Finally, the RREA will work with Customs authorities to make them aware of the quality issues and enlist their help in stopping poor quality products from entering the market. This may be carried out by instituting a Lighting Africa “stamp” — which signals to customs authorities that these products have already been classified as high-quality and as solar technology, which helps to bypass the normal customs and port clearing bureaucracy and ensures fees that are levied are in accordance with the law. Such an approach has worked well in Kenya.
* **Control Mechanism for the Exchange Program**: There is a risk of leakage of excessive amounts of returned kerosene lanterns, and abuse of the system whereby the RREA reimburses retailers for surrendered used lamps. Though the leakage is not expected to be significant, due to the relatively higher expense of solar lights as compared to kerosene lanterns or LED lamps, a close supervision of the participating retailers is included in the proposed project as part of the monitoring and evaluation effort, and will ensure that the traded in lanterns are eligible. In addition, the strategy of initiating the project with a pilot sales phase will allow for vetting retail partners ahead of the lantern exchange program.
* **Private Sector Interest:** Another risk is that the private sector may not be strong or interested enough to carry the lantern exchange effort due to its large scale and the relative newness of the off-grid lighting technology to Liberia. The project proponents and the Bank are aware of this risk and for this reason have implemented the market facilitation effort, or pilot phase, which is aimed at building up the private sector to market and sell small-scale solar products through assistance with trade finance and business facilitation support. The project team has already identified at least three private sector players who would be strong partners in the effort. Therefore the risk is considered moderate.
* **RREA’s capacity to implement:** An additional risk is the capacity of the RREA to implement the project, due as well to its relative newness as an institution. The RREA has only been in existence formally since January 2010 and substantively since April of the same year. However, the GEF program will be the fifth donor program that the RREA will implement since its establishment; its experience began with the AFREA program, and has since grown through rural energy program partnerships with the U.S. Agency for International Development and the Norwegian Agency for Development Cooperation. Finally, the RREA signed a grant agreement with the European Union’s Energy Facility to implement the country’s rural energy master plan and implement the Sustainable Solar Market Packages (SSMP) approach in August 2010. The Agency is in the process of hiring additional staff to carry out these efforts. Based on the institution’s experience carrying out the aforementioned donor projects, and the sound support it has enjoyed to date, the risk in this regard is also considered moderate.
* **Distance of retailer to the client:** Experience in many countries has shown that even the best designed energy access programs fail if the service provider is absent (in the case of give-away programs) or not sustainable. In the latter regard, the lessons learned from past programs support the idea of subsidizing the gap between consumer ability to pay and the cost of starting a solar business. Without a sustainable business, after-sales service will not be provided, and demand for the products, if they stop working, will cease. Based on this understanding, the proposed Lighting Lives program is designed to overcome this challenge by providing both initial business facilitation support and longer-term subsidization and supervision.

**Co-financing Arrangements**

1. The GEF grant leverages the Africa Renewable Energy Access (AFREA)-supported program *Catalyzing New Renewable Energy in Rural Liberia*, which began in August 2009 with the aim of helping to establish Liberia’s first-ever Rural and Renewable Energy Agency as a functioning agency that is able to mobilize new renewable energy services and investment for rural areas to meet demand in a technically reliable and affordable manner. Phase I of the project aimed at creating an enabling environment for the full functionality of the RREA, including recruiting and training of local advisors to help set up the Agency; development of legislation; preparation of targeted energy access pilot projects; and outfitting of the Agency for full operation including strategic and foundational documents, and its office and logistical capabilities. Phase I is complete.
2. Phase II of the program aims at demonstrating viable models for rural electrification; it has comprised Component C of LESEP. It was intended to include the following energy access pilot projects: (1) rehabilitation of a micro-hydropower mini-grid in the remote community of Yandohun, Lofa County, which is to be community operated and managed; and (2) implementation of the public-private Sustainable Solar Market Packages (SSMP) approach, in one or two large northwestern counties. Phase II is underway; the micro-hydropower rehabilitation project is ongoing, including training of the community management team, with commissioning anticipated for mid-2012. During bidding, the SSMP was unable to attract qualified bidders. As a result, the SSMP approach is being restructured into a solar market facilitation effort that retains the principles of SSMP and incorporates the activities and approach of the Lighting Africa program. This new Sustainable Solar Market Facilitation (SSMF) effort is a pilot program designed to catalyze the provision of affordable solar lighting devices for households without access to electricity.
3. The table below gives an overview of the co-financing arrangements for this project.

**Table 3: Co-financing arrangements by component**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Component** | **Total Project Cost (US$)** | **GEF grant**  **(US$)** | **World Bank (AFREA grant) (US$)** | **Private sector contribution (US$)** | **Government of Liberia (in-kind)** |
| **Component 1:** Creation of an Enabling Market Environment for Lighting Africa lighting Products. | **1,850,000** | 200,000 | 1,650,000 | 0 | 0 |
| **Component 2:** Lighting Liberia - Business Development for Use of solar energy for rapid scale-up of access to modern lighting. | **3,274,540** | 1,124,540 | 100,000 | 2,000,000 | 50,000 |
| **Component 3:** Project management | **380,000** | 130,000 | 250,000 | 0 | 0 |
| **TOTAL** | **5,504,540** | **1,454,540** | **2,000,000** | **2,000,000** | **50,000** |

**Results**

1. The main output of the Lighting Lives in Liberia program will be the large-scale dissemination of high-quality solar lighting products, with the ultimate goal of catalyzing lighting access for one million Liberian lives. The indicator of success is the project’s number of beneficiaries. The specific targets of the program are to:

* Build the capacity of the sector institutions and private sector to expand access to off-grid lighting;
* Nurture the dissemination of at least 100,000 high-quality Lighting Africa approved solar lanterns and micro systems, and catalyze the commercial dissemination of 100,000 more;
* Reduce GHG emissions from kerosene and GHG and environmental pollutants from disposable batteries;
* Facilitate the availability on the Liberian market of at least three different Lighting Africa approved solar products;
* Facilitate linkages between at least two distributors/retailers and Lighting Africa manufacturers for the importation of products, and ensure a supply chain to rural areas covering at least five counties;
* Develop enabling policies for reducing import and other policy and bureaucratic barriers for modern lighting products;
* Implement a consumer education campaign to educate the Government and the public on the benefits of high quality solar products, including instituting a renewable energy and energy efficiency standards setting program.

1. The proposed program will build a public-private partnership for off-grid lighting through utilizing grant funding, facilitating Government support, and nurturing a commercial market and rural supply chain. In doing so, the program activities are expected to result in a significant lasting impact and improve the lives of nearly one-third of Liberia’s citizens.

**Global Environmental Benefits**

1. The GEF project will produce global environmental benefits by helping to reduce present and future GHG emissions and other harmful environmental pollutants from the Liberian household energy sector. In particular, the program will eliminate directly the CO2 emissions from at minimum 100,000 kerosene and battery-powered lanterns whose use is terminated by the GEF project.
2. The effects on greenhouse gas emissions (GHG) from burning kerosene are well known and frequently touted. The effects on GHG emissions and the environment as a whole from disposal of batteries, however, is less discussed in the context of off-grid lighting. Batteries are increasingly in demand worldwide due to the rapid increase in use of portable power-consuming products such as cellular phones, and in Liberia in particular due to the rapid increase in use of low-quality battery-powered lights. In Liberia both urban and rural consumers dispose of many thousands of batteries every year, which contain toxic or corrosive materials such as mercury, lead, and lithium, without any adequate waste handling facilities in the country. These batteries are disposed directly into the environment, where they become hazardous waste and pose threats to human health and the environment.
3. Batteries also contribute significantly to GHG pollution. It has been estimated that one regular (e.g. AA) nickel-metal hydride (NiMH) rechargeable battery has 28.5 times less GHG impacts, and 23 times less potential impact on non-renewable natural resources, than its alkaline equivalent; in addition, it generates 1/30th the air pollution, and a fraction of the amount of water contamination created by the manufacture, transportation, and use of a disposable alkaline cell. Estimates of the CO2 emissions equivalent of a disposable alkaline battery range from 0.35 to 1 kg; thus, the savings per disposable battery will be 0.34 to 0.97 kg CO2eq.[[15]](#footnote-15) The current calculation uses an emissions equivalent of 0.5 kg CO2eq.
4. The emissions reductions to be achieved from this project are shown in the below table. Calculations are based on the recent findings of the aforementioned willingness to pay study in Liberia, which showed that only 10% of household respondents were using kerosene, while consumption of disposable battery-powered lights dominated the majority. The calculation is therefore based on the assumption that 10% of the lamps replaced are kerosene and the remainder are disposable battery-powered (assumes alkaline, as this is the most common and cheapest battery in use). The calculation assumes lighting consumption to be four hours per night.
5. The calculation also takes into account the emissions that result from production, transportation, and use of rechargable batteries such as those used in the Lighting Africa products. The calculation assumes a battery life of one year for these products, which is conservative—battery life ranges from one year in the worst case to five years in the best in the currently approved budget and mid-range category products. The calculation assumes 0.2 kg CO2eq for these products, which is the estimated amount for NiMH rechargeable batteries.[[16]](#footnote-16) No data was available for other types of rechargeables. The amount of CO2 estimated to be produced from Lighting Africa product batteries was subtracted from the estimated emissions resulting from alkaline batteries to arrive at the amount displaced from removal of alkaline batteries from the household sector.
6. Based on these estimates, this project is expected to directly offset the emission of about 335,000 tons of CO2 at an average cost of US$6.07/ton of CO2 (considering only the direct grants for 100,000 lanterns of approximately $1.1 million). This is an annual reduction of CO2 emissions of about 112,000 tons. The analysis is conservative as it assumes that the solar lantern has only a 3-year life overall.
7. Including the multiplier effects of market conditioning activities and capacity strengthening work done under this project, significantly greater emissions reductions will occur as an indirect effect. Achieving dissemination of 200,000 lanterns overall would offset about 671,000 tons of CO2 at an average cost of US$3.03/ton of CO2. This means the indirect effects will serve to double the direct carbon emissions reductions effected by the project and increase its cost effectiveness.

**Table 4: Calculation of CO2 Emissions Savings**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Factors** | **Kerosene** | **Units of Measure-ment** | **Alkaline Batteries** | **Units of Measure-ment** | **Rechargeable Solar Batteries** | **Units of Measure-ment** | **Total** | **Units of Measure-ment** |
| Number of lanterns | 10,000.00 |  | 90,000.00 |  | 100,000.00 |  | 100,000.00 |  |
| Amount kerosene or batteries used per lantern | 43.80 | liters per year \* | 116.80 | batteries per year † | 1 | batteries per year ‡ |  |  |
| Total amount used in 3 years for all products | 1,314,000.00 | liters in 3 years | 31,104,000.00 | batteries in 3 years | 300,000.00 | batteries in 3 years |  |  |
| Carbon emissions over 3 years | 3,383.81 | Tons CO2 ˜ | 388,800.00 | Tons CO2 \*\* | 56,700.00 | Tons CO2 \*\*\* |  |  |
| Carbon emissions avoided over 3 years (life of LA product) | 3,383.81 | Tons CO2 | 332,100.00 | Tons CO2 ^ |  |  | 335,483.81 |  |
| Annual reduction of CO2 | 1,127.94 | Tons CO2 | 110,700.00 | Tons CO2 ^ |  |  | 111,827.94 |  |
| Carbon emissions avoided over life of LA product if 200,000 lanterns are catalyzed | 6,767.62 | Tons CO2 | 664,200.00 | Tons CO2 ^ |  |  | 670,967.62 |  |
| GEF Grant for lanterns | 112,454.00 |  | 1,012,086.00 |  |  |  | 1,124,540.00 |  |
| GEF grant cost of direct emissions avoided | 33.23 | $/Tons CO2 | 3.05 | $/Tons CO2 |  |  | 6.07 | $/Tons CO2 ~ |
| Total GEF grant cost per ton CO2 avoided by catalyzing double number of lanterns | 16.62 | $/Tons CO2 | 1.52 | $/Tons CO2 |  |  | 3.03 | $/Tons CO2 ~ |

**Notes:**

\* 0.03 liters/hr, 4 hours per day (Lumina Project reports range from 0.005 to 0.042 liters/hour, http://eetd.lbl.gov/emills/pubs/pdf/offgrid-lighting.pdf)

† Assumes life of 25 hours per alkaline battery, 4 hours use per day; 2 batteries per inferior lighting product

‡ Conservatively assumes one year battery life; approved LA products have batteries ranging from 1-5 years of life)

˜ 2.58 kg CO2 per liter

\*\* 0.5 kg CO2 equivalent per hour of use (http://www.climatop.ch/downloads/E-Fact\_Sheet\_Migros\_Batteries\_v5.pdf)

\*\*\* Assumes 0.2 kg Co2 equivalent per hour of use, comparable to NiMH rechargeable batteries

^ Subtracts emissions of rechargeable batteries from that of alkaline over same period

~ Provides average of the two displaced lighting sources.

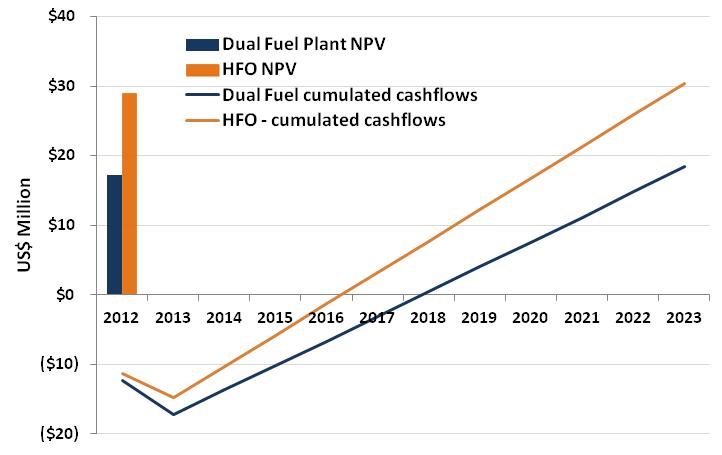
# Annex 5A. Financial analysis

1. The financial analysis addressed the different scenarios when considering the two similar technologies for power generation. Both technologies offer the same possibility of providing electricity a lower cost compared with diesel power generation. The financial analysis address the situations of HFO availability, electricity tariff changes, capacity factor changes as well. The main conclusions of the this assessment are the following:

* Provided that HFO is available from 2014, either a 10MW dual fuel plant or a HFOplant are financially viable (internal rate of return (IRR) respectively of 22.7% and 13.5%) and LEC will be able to reimburse the loan in both cases. LEC would realize savings of US$12 million with the HFO plant compared with the dual fuel option.
* The main risk to the project’s financial viability in both cases is the availability of HFO. If the dual fuel plant has to run with more expensive fossil fuel for more than four years, the plant would not be financially viable.

1. The costs of running the dual fuel plant with diesel are higher than the revenues generated (with the current tariff of 54 US cents/kWh) due to lower efficiencies compared with the HFO-fired power plant and the higher cost of fossil fuel. . Additional results are as follows:
2. Results independently of financing. The IRR for the HFO plant is 22.7%. The IRR for the dual fuel plant is 13.5%. Provided that HFO is available from 2014, LEC will realize savings of US$12 million with the HFO plant compared with the dual fuel option.
3. Results with 100% IDA debt financing. Assuming that the project is fully financed with debt under IDA terms,
4. **Figure 1** below shows that the net present value (NPV)[[17]](#footnote-17) for the HFO plant (light orange column) is higher than the NPV for the dual fuel plant (dark blue column) – respectively US$29 million and US$17 million. The cumulated cash-flows of the HFO plant are indeed higher (light orange line for HFO and dark blue line for dual fuel).

**Figure 1: Net Present Value and Cumulated Cash-flows**



1. The debt service coverage ratio (DSCR) for the HFO plant is comfortable, at 2.8 over the period. The DSCR for the dual fuel plant is 2.0. However if we assume that HFO is not available, then both plants would have DSCR equal or below 0.

1. Results of the sensitivity analysis. We tested the sensitivity of the financial viability of the dual fuel and HFO plants. The main risk to the project’s financial viability is the availability of HFO. Only severe and unlikely changes to the other key assumptions would make the project not financially viable:

* Year when the plant uses HFO – A HFO plant would not be able to run without HFO. If HFO is not available during more than seven years (out of the plant life of ten years), the HFO plant would not be financially viable. A dual fuel plant would run on diesel if HFO is not available. Using HFO means lower operations and maintenance (O&M) costs and higher plant availability. If the dual fuel plant has to run with the more expensive diesel more than four years, the plant would not be financially viable. Therefore, any delay in providing HFO would impact negatively the financial viability of both projects and the ability to repay the debt.
* Tariff – Assuming IDA financing, the HFO plant would be financially viable (its NPV would be positive) if the tariff is above 42 US cents/kWh. For the dual fuel plant, the breakeven tariff is 47 US cents/kWh. This is substantially lower than the current tariff of 54 US cents/kWh. With the current tariff, the costs of running the dual fuel plant with diesel are higher than the revenues generated. In this case, the financial viability of the HFO plant (that is not running when HFO is not available) will always be superior to the financial viability of the dual fuel plant. However if we assume that the willingness to pay is higher (that is that the users are willing to pay more than the current tariff or that the government is ready to provide subsidies in addition to the tariff to avoid outages), then the dual fuel plant can have higher financial returns than the HFO plant depending on HFO availability.
* Capacity factor – The HFO and the dual fuel plants would be financially viable if the capacity factor is respectively above 16% and 24%. While generating less power, the plant receives fewer revenues but also incurs less O&M costs. This explains in part why the capacity factor can be so low while the projects still viable. Currently LEC’s management contractor estimates the capacity factor at 60%.
* O & M cost – The HFO and the dual fuel plants would be financially viable if the O&M cost remains below 0.30 US cents/kWh. LEC’s management contractor currently estimates O & M costs at 0.19 US cents/kWh for HFO and 0.31 US cents/kWh for diesel.

1. Assumptions used. shows the technical and financial assumptions.

**Table 1: Technical and Financial Assumptions**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Item | Unit | Dual Fuel | HFO | | Source |
| Technical | | | | | |
| Capacity | MW | 10 | | 10 | LEC management contractor |
| Construction period | Years | 1.3 | | 1.3 | World Bank assumption |
| Start of construction | Year | 2012 | | 2012 | World Bank assumption |
| Life of the plant | Years | 10 | | 10 | World Bank assumption |
| Year when plant uses HFO | Year | 2014 | | 2014 | World Bank assumption based on indicative timeline for HFO terminal |
| Availability factor | % | 93% | | 93% | LEC management contractor |
| Financial (independently of financing) | | | | | |
| Total operating cost | $/kWh | 0.24 | | 0.21 | LEC management contractor |
| Tariff | US$ | 0.54 | | 0.54 | Current tariff |
| Part of tariff covering generation | % | 81% | | 81% | Cost of T&D around 10 cents (World Bank) |
| Collection rate | % | 92% | | 92% | Current management contract performance |
| Depreciation period | Years | 10 | | 10 | Same as life of the plant (World Bank assumption) |
| Termination value | % of capex | 0% | | 0% | World Bank assumption |
| Tax rate | % | 35% | | 35% | http://www.doingbusiness.org/data/exploreeconomies/liberia/paying-taxes/ |
| Working capital is assumed to be nil because some customers have prepaid meters and the utility plans to install more and for simplicity | | | | | |
| Financial (with 100% IDA debt financing) | | | | | |
| Equity | % | 0% | 0% | | World Bank assumption |
| Debt | % | 100% | 100% | | World Bank assumption |
| Equity - Estimated return | % | 10% | 10% | | World Bank assumption for a public utility |
| Debt - Interest rate | % | 0.75% | 0.75% | | IDA terms. July 2011 |
| WACC | % | 0.49% | 0.49% | | Calculation of the WACC |
| Debt - Tenor | Years | 9 | 9 | | Life of the plant minus grace period (World Bank assumption) |
| Debt - Drawdown | Year | 2012 | 2012 | | Full drawdown at start of construction (World Bank assumption) |
| Grace period | Years | 2 | 2 | | Repayment starts at end of construction (World Bank assumption) |

# Annex 5B. Financial Management and Disbursement Arrangements

1. *Introduction:* In accordance with the Financial Management Practices Manual issued by the Financial Management Sector Board on March, 2010, a financial management assessment was carried out to assesses the adequacy or otherwise of the financial management arrangements for managing the Liberia Electricity System Enhancement- Additional Financing project by the Liberian Electricity Corporation (LEC).
2. The objective of the assessment was to determine whether LEC has acceptable financial management arrangements, which will ensure: (1) the funds are used only for the intended purposes in an efficient and economical way; (2) the preparation of accurate, reliable and timely periodic financial reports; (3) safeguard the entity’s assets; and (4) adequate fiduciary assurances are provided through an independent audit of the project. The LEC Finance Department will undertake the financial management functions of the project. The overall FM risk for the project has been assessed as Medium-I. But, with the articulated risk mitigation measures through the use of the international management contractor, Manitoba Hydro International (MHI) during implementation, this FM risk will residually fall to *Moderate*.
3. *Country and Sector Issues*: A PEMFAR was conducted in 2007 that included an analysis of Liberia’s Public Financial Management (PFM) strengths and weaknesses. The findings from the PEMFAR showed that the government has taken considerable actions to improve public financial management since 2006.
4. In partnership with multilateral and bilateral development partners, the government has implemented a wide range of public financial management reforms covering aspects of policy, legislation and institutional arrangements and systems. These reforms have sought to restore working conditions of the PFM systems and to modernize them to enable Government respond better to implementing its poverty reduction and development strategies. The most critical of these reforms has been the passing of the PFM Act in August 2009 which has also provided the foundation of other PFM reforms. Several institutional reforms have also been implemented; a macro fiscal analysis unit has been created; the former Bureau of the Budget has been merged into the Ministry of Finance (MoF), as a department; a Debt Management unit has been strengthened and the accounting function has been unified by merging two department and bringing them under the control of the Comptroller General. Moreover, the Cabinet approved the Internal Audit strategy in June 2008 that will see the establishment of an internal audit cadre and a charter clarifying the roles and responsibilities for internal controls.
5. The government has also adopted Cash Basis IPSAS as the standard for government accounting. The implementation of the IFMIS has automated government accounting and preparation of budget and fiscal outturn reports in the MoF. Government revenues have increased several folds since 2002/03, and expenditure controls have been strengthened through the establishment of the cash management committee and the interim commitment control system. The government’s developmental and poverty reduction priorities are anchored in the PRSP which is generally aligned with the budget although there is no formal poverty reducing expenditure tracking systems. The budget cycle is coordinated by an inter-ministerial Budget Committee and spending ministries are consulted early in the budgeting process. All revenues are by law deposited into a revenue bank account at the Central Bank and expenditure from this account is strictly in accordance with annual cash plans and allotments. Notwithstanding these improvements, many challenges remain.
6. There is the critical need to expand and deepen the implementation of the PFM law and to have its full effect on all aspects of Government PFM systems. Improving budget credibility will be key particularly as Government implements its second generation PRS over 2012/13-15/16; it will be critical to strengthen alignment of the budget during its formulation and execution with its policy commitments and extend its coverage to more aspects of aid resources and other areas that have hitherto not been well captured. In the same vein, improving accounting and reporting and the oversight functions of the General Audit Commission and the Legislature will need to be addressed. Importantly, attention will need to be paid to strengthen roles of key PFM units (Ministry of Finance Ministry of Planning and Economic Affairs and M&As) to provide requisite leadership in the implementation of the reforms. Moreover, majority of donor expenditure is project based and not executed through the government budget. This is critical and needs to be addressed in accordance with the aspirations of the Paris Declaration and Accra Agenda for Action on aid effectiveness and use of country systems.
7. Furthermore, the country lacks a sufficient number of qualified accountants to serve the public and private sector. A Project Financial Management Unit (PFMU) hosted in the MoF provides centralized project financial management for donor projects as capacity augmentation arrangement in the short to medium term. The lack of qualified PFM personnel is a major constraint to the implementation of PFM reforms to address the weaknesses identified in the PEMFAR. At the moment key agencies such as the MOF are staffed with foreign experts through technical assistance financed by development partners. In the area of procurement, the Public Procurement and Concessions (PPC) Act came into effect in January 2006, as Liberia’s first significant step towards subjecting public sector contracts to transparency and meaningful competition. These measures in financial management and procurement will put in place appropriate structures and processes to promote transparency and accountability and mitigate the fiduciary risk in utilizing public funds both at the country and project level.
8. *Overview of Project and Institutional Arrangements*: The objective of the proposed project is to improve and increase access to electricity in Liberia.
9. Project financial management will largely rely on the existing LEC accounting system in place to ensure an effective and efficient management of resources. The Liberian Electricity Corporation (LEC) has a management contract with Manitoba Hydro International (MHI) to manage the operations of LEC for a period of 5 years. The MHI has finance and accounting unit that will be responsible for the financial management work of LEC for the duration of the contract. The old finance unit of LEC in conjunction with that of MHI is staffed with a Chief Financial Officer (CFO), an Assistant Controller, a Chief Accountant, two Accounting Officers and Internal Auditor who reports directly to the Board of Directors of LEC. The Assistant Controller and the Chief Accountant report directly to the CFO. Together the accounting unit has over 35 years of accounting experience. Moreover, the LEC is currently implementing the original LESEP project being financed by IDA worth $10 million. LEC Finance Department will build on its experience of the Bank’s disbursement and financial management procedures through this additional financing. The FM unit will be responsible for: maintaining up to-date accounting records and ledgers, submitting interim financial reports, submitting annual financial audit reports and ensuring that internal controls are adhered to in order to achieve accountability at all levels. The staffing strength of LEC was assessed as adequate for the purposes of undertaking the financial management of the project
10. *Budgeting:* LEC will prepare an annual budget based on an annual work plan that has been approved by the World Bank. Most of the activities of the key components are already known and these will be included in the Credit’s annual budgets. The budget will be approved by the World Banks and incorporated into the quarterly interim un-audited financial reports for monitoring against actual expenditures of activities within components and disbursement categories of the project during implementation.
11. *Internal Control & Internal Auditing:* LEC has an internal audit unit that reviews all financial transactions to ensure that the transactions comply with project financing agreements and all national financial rules and regulations. Moreover, LEC’s FM manual has laid down internal control procedures and processes that ensure that transactions are approved by appropriate personnel and ensure segregation of duties between approval, execution, accounting and reporting functions. The Internal Audit unit is manned by two qualified staff who perform periodic reviews and report on their findings. The presence of these internal audit functions in LEC has strengthened its internal managements. Currently, the focus of the internal audit functions is split between pre-audit and systemic audits. The emphasis on both pre-audit and systemic checks has added greater value to their control functions.
12. *Accounting and Maintenance of Records*: Accounting for the use of the project funds, using a cash basis of accounting, will be carried out by the LEC using its automated accounting system (Quick Books Accounting system) that provides for adequate segregation of function, accurate recording of all accounting transactions of the project. The system is also capable of producing accurate periodic financial reports including interim un-audited financial reports (IFR) and annual project financial statements that considered acceptable to the Bank. A project Fixed Assets register will be maintained at all times to correctly reflect assets acquired or created under the project.
13. *Financial Reporting Arrangements*: LEC will prepare quarterly Interim (un-audited) Financial Statements or Reports (IFR) to be submitted to the World Bank within 45 days after the end of each calendar quarter. The IFR will comprise the following statements: sources and uses of funds; Uses of Funds by activity within component; status of funds disbursement; schedule of commitments/contracts; schedule of fixed assets (acquired under the Grant); bank statements and bank reconciliation statements.
14. *External Auditing Arrangements*: The Liberia General Auditing Commission (GAC) will carry out an annual financial audit of the project. The arrangements for the audit of the project must be finalized within four months of the project being declared effective. The CF’s annual financial statements including designated accounts activity will be audited in accordance with International Standards of Auditing (ISA) and a single opinion will be issued to cover the project financial statements, SOEs and the designated account. The auditors’ report and opinion in respect of the financial statements including the management letter would be furnished to the World Bank within six months of the close of each GoL fiscal year.
15. *Funds Flow and Disbursement Arrangements*: Under the Credit, LEC will establish a Designated Account with a commercial bank approved by the World Bank. The Designated Account will be maintained in US$ to receive disbursements from the Credit. LEC will execute the activities as approved in the procurement plan in respect to the project components and make payments for approved and authorized transactions to contractors, suppliers and service providers. The report-based disbursement method (Interim Financial Reports) will be used as a basis for the withdrawal of credit proceeds.
16. The project provides for the use of advances, reimbursements, special commitments and direct payments as applicable disbursement methods, and these will be specified in the disbursement letter. An initial advance will be provided for the implementing entity, based on a forecast of eligible expenditures against each component, linked to the appropriate disbursement categories and in accordance with instructions provided in the Disbursement Letter. These forecasts will be premised on the annual work plans that will be provided to IDA and cleared by the task team leader. Replenishments, through fresh withdrawal applications to the Bank, into the designated accounts will be made subsequently, at quarterly intervals, but such withdrawals will equally be based on the net cash requirements that are linked to approved work plans. Supporting documentation will be retained by the implementing agencies for review by IDA missions and external auditors. Any advances made for contracts will be secured by a bank guarantee or performance-based bonds and a retention amount withheld.
17. For a period of four (4) months after the closing date of the Grant, disbursements for expenditures incurred prior to the closing date will be allowed.
18. *Disbursement Summary*: The disbursement summary by category is shown in the table below:

|  |  |  |
| --- | --- | --- |
| **Category** | **Amount of the Credit Allocated (expressed in USD)** | **Percentage of Expenditures to be Financed**  **(inclusive of Taxes)** |
| Sub-component A.1: Distribution network reinforcement and extension. | 3,000,000 | 100% |
| Component B1: Construction of Thermal Plant | 16,000,000 | 100% |
| Component D: Technical Assistance | 500,000 | 100% |
| Unallocated | 1,500,000 | 100% |
| **TOTAL** |  |  |

1. *FM Supervision plan*: Consistent with the risk rating an annual FM implementation support mission will be carried at the LEC. The FM supervision missions’ objectives will include ensuring that strong financial management systems are maintained for the project at the LEC and providing adequate FM implementation guidance provided to LEC throughout the project’s life. The supervision will include desk reviews of IFRs, testing of expenditures, review of audit reports, and evaluation of the efficiency of the payment processing, internal control processes, and funds flow arrangements.

**Financial Management Assessment of RREA**

1. *Introduction:* In accordance with the Financial Management Practices Manual issued by the Financial Management Sector Board on March, 2010, a financial management assessment was carried out to assesses the adequacy or otherwise of the financial management arrangements for managing the LESEP project by the Liberia Rural Renewable Energy Agency (RREA).
2. The objective of the assessment was to determine whether RREA has acceptable financial management arrangements, which will ensure: (1) the funds are used only for the intended purposes in an efficient and economical way; (2) the preparation of accurate, reliable and timely periodic financial reports; (3) safeguard the entity’s assets; and (4) adequate fiduciary assurances are provided through an independent audit of the project. The RREA Finance Department will undertake the financial management functions of the project. The overall FM risk for the project has been assessed as *High*. But, with the articulated risk mitigation measures during implementation, this FM risk will residually fall to *Substantial*.
3. *Overview of Project and Institutional Arrangements*: The objective of the proposed project is to improve and increase access to electricity in Liberia,
4. Project financial management and coordination will rely on the existing RREA accounting system in place to ensure an effective and efficient management of resources. The RREA has been responsible for implementing the Bank Executed (BE) Rural Electrification project in Liberia since its inception in April of 2010. The Agency is now executing the $2 million Recipient Executed World Bank financed Catalyzing New Renewable Energy in Rural Liberia project. The RREA is staffed with a strong project implementation team with vast experience in rural electrification. The finance unit is also staffed with an Accountant who has about 9 years of project financial management experience. As part of its contribution to the project, the Government of Liberia (GoL) has committed $200,000 to support project staff salaries. Part of this amount will be used to recruit an incremental Accounting Officer to support this project.
5. *Budgeting:* RREA will prepare an annual budget based on an annual work plan that has been approved by the World Bank. Most of the activities of the key components are already known and these will be included in the Credit’s annual budgets. The budget will be approved by the World Banks and incorporated into the quarterly interim un-audited financial reports for monitoring against actual expenditures of activities within components and disbursement categories of the project during implementation.
6. *Internal Control & Internal Auditing:* RREA’s FM manual has laid down internal control procedures and processes that ensure that transactions are approved by appropriate personnel and ensure segregation of duties between approval, execution, accounting and reporting functions.
7. *Accounting and Maintenance of Records*: Accounting for the use of the project funds, using a cash basis of accounting, will be carried out by the RREA using its automated accounting system (Quick Books Accounting system) that provides for adequate segregation of function, accurate recording of all accounting transactions of the project. The system is also capable of producing accurate periodic financial reports including interim un-audited financial reports (IFR) and annual project financial statements that considered acceptable to the Bank. A project Fixed Assets register will be maintained at all times to correctly reflect assets acquired or created under the project.
8. *Financial Reporting Arrangements*: RREA will prepare quarterly Interim (un-audited) Financial Statements or Reports (IFR) to be submitted to the World Bank within 45 days after the end of each calendar quarter. The IFR will comprise the following statements: sources and uses of funds; Uses of Funds by activity within component; status of funds disbursement; schedule of commitments/contracts; schedule of fixed assets (acquired under the Grant); bank statements and bank reconciliation statements.
9. *External Auditing Arrangements*: The Liberia General Auditing Commission (GAC) will carry out an annual financial audit of the project. The arrangements for the audit of the project must be finalized within four months of the project being declared effective. The CF’s annual financial statements including designated accounts activity will be audited in accordance with International Standards of Auditing (ISA) and a single opinion will be issued to cover the project financial statements, SOEs and the designated account. The auditors’ report and opinion in respect of the financial statements including the management letter would be furnished to the World Bank within six months of the close of each GoL fiscal year.
10. *Funds Flow and Disbursement Arrangements*: Under the Credit, RREA will establish a Designated Account with a commercial bank approved by the World Bank. The Designated Account will be maintained in US$ to receive disbursements from the Credit. RREA will execute the activities as approved in the procurement plan in respect to the project components and make payments for approved and authorized transactions to contractors, suppliers and service providers. The report-based disbursement method (Interim Financial Reports) will be used as a basis for the withdrawal of credit proceeds. The project provides for the use of advances, reimbursements, special commitments and direct payments as applicable disbursement methods, and these will be specified in the disbursement letter.
11. An initial advance will be provided for the implementing entity, based on a forecast of eligible expenditures against each component, linked to the appropriate disbursement categories and in accordance with instructions provided in the Disbursement Letter. These forecasts will be premised on the annual work plans that will be provided to IDA and cleared by the task team leader. Replenishments, through fresh withdrawal applications to the Bank, into the designated accounts will be made subsequently, at quarterly intervals, but such withdrawals will equally be based on the net cash requirements that are linked to approved work plans. Supporting documentation will be retained by the implementing agencies for review by IDA missions and external auditors. Any advances made for contracts will be secured by a bank guarantee or performance-based bonds and a retention amount withheld.
12. For a period of four (4) months after the closing date of the Grant, disbursements for expenditures incurred prior to the closing date will be allowed.
13. *Disbursement Summary*: The disbursement summary by category is shown in the table below:

|  |  |  |
| --- | --- | --- |
| **Category** | **Amount of the Credit Allocated (expressed in USD)** | **Percentage of Expenditures to be Financed**  **(inclusive of Taxes)** |
|  |  |  |
| **TOTAL** |  |  |

1. *FM Supervision plan*: Consistent with the risk rating and semi-annual FM implementation support mission will be carried at the RREA. The FM supervision missions’ objectives will include ensuring that strong financial management systems are maintained for the project at the RREA and providing guidance to RREA on financial management issues throughout the project’s life. The supervision will include desk reviews of IFRs, testing of expenditures, review of audit reports, and evaluation of the efficiency of the payment processing, internal control processes, and funds flow arrangements.

# Annex 6. Procurement Assessment

**LESEP ADDITIONAL FINANCING**

**Procurement Assessment of the two Agencies’ capacity to implement procurement**

1. An assessment of the capacity of the two Agencies, which operate under the aegis of the Ministry of Mines Lands and Energy, i.e. Liberia Electricity Corporation (LEC) and the Rural and Renewable Energy Agency (RREA) to implement procurement actions under theLESEP was originally carried out in October 2010 by a World Bank Consultant based in the Ghana Country Office. The assessment was validated in November 2011. The validation reviewed, to some extent, the organizational structure for implementing the respective project components and the interaction between the projects’ staff responsible for procurement and the environment within which procurement is to be delivered. The risks identified for the LEC assessment were: (i) inadequate capacity to handle the high volume of procurement actions; (ii) lack of in-house experience and familiarity with World Bank procurement guidelines and procedures, (iii) sustainable capacity by LEC staff to handle procurement when MHI contract expires; and (iv) fraud and corruption. On the other hand the risks identified for the RREA assessment were: (i) lack of publication of the relevant legislation to legitimize the existence of RREA and make it operational as a Government Agency; (ii) the Procurement Specialist’s limited experience with World Bank Guidelines and procedures to facilitate the management of the procurement cycle; and (iii) the low number of recruited staff, limiting appointment of procurement committee, etc.
2. ***Liberia Electricity Corporation (LEC)***
3. The LEC was established as a corporation by the “Act to Amend the Public Authorities Law to Create the Liberia Electricity Corporation” in July 12, 1973. The Corporation is overseen by LEC’s Board of Directors. Its procurement rules respond to the Public Procurement and Concessions Act (PPCA) of Liberia, which was enacted in 2005, and amended and restated in September 2010 and herein called ‘The Amendment and Restatement of the Public Procurement and Concession Act, 2010’. It provides a good legal framework for the conduct of transparent and comprehensive procurement. In response to the PPCA, LEC as a procurement entity has the required structures, i.e. a procurement unit and a procurement committee. Further, ad hoc evaluation panels are set up to evaluate bids and make recommendations to the Procurement Committee, as required by law, whenever there is a process that involves competition. The procurement and supply management functions are clearly distinguished, and LEC has auditing arrangements in-house. In addition, it has clear technical and administrative controls for reviews, approvals and decision making.
4. LEC has hired a Management Contractor, Manitoba Hydro Incorporated (MHI) to manage the project for a period of 5 years. The key functions at LEC are assigned and duly staffed. LEC has a Customer Service, Distribution & Procurement Unit which is responsible for procurement. Up to July 2011, the procurement function was headed by an Executive Director (ED) who was a qualified Engineer and a Procurement Specialist, with a lot of experience in Donor funded projects. He was part of the MHI team. He was ably assisted by three local LEC staff, two with responsibility for procurement and the third responsible for the Warehouse. The Executive Director resigned in July 2011 and MHI have not replaced him. Since that time, Procurement is headed by the Procurement Manager and his Assistant are well qualified to handle procurement in line with the PPC Act. However, they have no experience in procurement for donor funded projects. To strengthen the Procurement Unit, a Procurement Analyst has now been added to the unit. The Procurement Analyst is new to procurement and has never had previous training in procurement. MHI continues to assist the procurement team using a Supply Chain Management Specialist (SCMS), who continues to be in charge of Materials Management. The SCMS is based in Canada but comes to Liberia once in a while.
5. Procurement was carried out by the ED before he resigned. It was also apparent that there was no training of the local staff as they are still unfamiliar to World Bank procurement procedures. Since the departure of the ED, a total of 5 ICB procurements have been initiated, all of which are still in progress. The staff to some extent have managed because the procurement involved is mostly a repeat of what was previously done and previous documents have been used as templates.
6. Record keeping at the time of the assessment was satisfactory. The procuring unit maintains a complete record of the process. However, the system can be improved for easier access to documents.
7. The current LEC Procurement Unit key staff, their designations, qualifications and procurement training are shown in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Designation** | **Qualifications** | **Procurement Training** |
| 1. | Supply Chain Management Specialist | B.A Degree in Economics, University of Manitoba.  Journeyman Construction Electrician Certificate, University of Manitoba. | Certified Professional Purchaser (CPP) from Purchasing Management association of Canada. |
| 2. | Procurement Manager | Associate degree, Business Administration, Zion University, Liberia. Certificate in Leadership Training. | PPCC procurement workshop.  PPCC/World Bank procurement Workshop and monthly Clinics |
| 3. | Assistant Procurement Manager | Associate Degree in Management & Economics | None |
| 4 | Procurement Analyst | BSc Economics | World Bank monthly Procurement Clinics |
| 5. | Warehouse Officer | Associate Diploma in Accounting | None |

1. It is clear from the assessment that LEC is in compliance with the Liberian Public Procurement and Concessions Act. It has a procurement committee and a procurement unit with officers with good academic backgrounds, and has some training in procurement. Further, it has adequate internal technical and administrative controls and anti-corruption measures and appeal mechanisms for bidders as required under the PPCA. However, there is a clear need for a Procurement Specialist with experience in donor funded projects. This will ensure that MHI builds the procurement capacity of the local staff in donor funded procedures, through mentoring and coaching, to enable them take over when the contract of MHI expire.
2. Thekey risk areasand proposed mitigation measures and/or actions are identified in the Table below:

| **No** | **Key risks** | **Mitigation Actions** | **By Whom** | **By When** |
| --- | --- | --- | --- | --- |
| 1 | Inadequate capacity to handle the high volume of procurement actions | Recruit a Procurement Specialist with international experience to replace the expertise that was with the ED who resigned in order to maintain the same level of service from the Management Contractor | LEC | As soon as possible. |
| 2 | Lack of in-house experience and familiarity with World Bank procurement guidelines and procedures | Focused capacity building for existing staff specific to the areas of weakness, i.e., capacity building program to be developed to respond to specific gaps identified. | The Head of Customer Service, Distribution and Procurement | Throughout project life. |
| 3 | Sustainable capacity by LEC staff to handle procurement when MHI contracts expires | Sponsor all the local procurement staff to attend World Bank procurement procedures courses in Goods, Works and Consultancy at GIMPA, Ghana or ESAMI, Tanzania. | LEC | Whenever the courses are organized. |
| 4 | Fraud and Corruption | The local staff should be offered motivating opportunities such as coaching, mentoring and formal training to improve their procurement skills so as to merit salary increment. | LEC | Throughout project life. |

1. The overall procurement risk for LEC is high.
2. ***Rural and Renewable Energy Agency (RREA)***
3. The establishment of the Rural and Renewable Energy Agency (RREA) of Liberia was effected through Executive Order No. 23 of January 8, 2010 to support all economically viable, socially acceptable and environmentally friendly energy projects and programs, especially renewable energy, to promote the economic and social development of Liberia’s rural population. The Agency is overseen by the Ministry of Lands, Mines and Energy of Liberia (MLME) for policy and planning purposes; however, the RREA is to be an autonomous agency with its own Board of Directors. The full statutes establishing the Agency have been in final draft stage for over a year as the Legislature have not yet ratified the required legislation. It is hoped that the Legislature, which is currently on agricultural break until January 2012, will soon ratify the legislation.
4. Since the legislation to crystallize the establishment of RREA is still not completed, the legal status of RREA has not been fully established. Nonetheless, the RREA has been granted some operational funds from the national budget in recognition of the lead role it is expected to play in the Government’s prioritized energy access agenda. The delay in the publication of the relevant legislation was considered a significant limitation; it prevented RREA from accessing additional Government resources to, among others, recruit additional staff, set-up a Procurement Unit and appoints a Procurement Committee, in order to operate as a full-fledged Government Agency subject to the national laws. RREA has, however, now started getting some funding from the national budget such that staff is now financed using GoL funds through “Professional Service” contracts. Government salaries are higher than those that were been paid through World Bank funding although the take-home pay is almost the same because of taxes. Using the GoL funding RREA is now in the process of recruiting one Procurement Assistant as an effort towards the establishment of the Procurement Unit. After legislation RREA procurement rules will also respond to the Public Procurement and Concessions Act (PPCA) of Liberia, which was enacted in 2005, and provides a good legal framework for the conduct of transparent and comprehensive procurement.
5. Through LESEP, RREA has now started building a procurement management track record, in procurement planning, preparation of bidding documents, management of bidding process from advertisement to bid opening, bid evaluation, contract award, preparation and signing of contract, contract management and the general handling of the procurement cycle. However, no selection of consultants have been carried out yet.
6. RREA under the Executive Director is, by and large, an agency that is still being built-up from scratch. Its Procurement Unit is manned by a Procurement Officer who graduated with a Bachelor of Art Degree in Management from University of Liberia in September 1996, and is currently pursuing a Master of Science Degree in Regional Planning at the same University. Prior to joining RREA in April 2010, he had undergone and received, as applicable, the following procurement related training and/or employment engagement in identified positions as follows, i.e.
7. Certificate, UNDP Procurement Certification Examination, under Bureau of Management, UNDP New York in November 2, 2006).
8. Certificate, UNDP/IAPSO Civil Works Procurement Training from September 10 - 12, 2007.
9. Procurement Assistant, UNDP, Monrovia (September 4, 2006 – July 15, 2008).
10. Senior Procurement Officer/Supervisor, Liberia Bank for Development and Investment (LBDI) from October 29, 2002 to August 26, 2006, having been Procurement Officer for LBDI from June 29, 2001to October 29, 2002, and Junior Procurement Officer (LBDI) from August 13, 1998 to June 29, 2001.
11. In addition, he attended the National Public Procurement Seminar held at the Monrovia City Hall in 2004 as a representative of LBDI.
12. Being under establishment, there is no procurement oversight and auditing; some controls in the areas of technical oversight and administration are provided by the Executive Director. There are also, currently, no clearly written standards, procedures and delegations of authority and responsibility.
13. Record keeping at the time of the assessment was satisfactory. The procuring unit maintains a complete record of the process. However, the system can be improved for easier access to documents
14. It is concluded from the procurement assessment that though an Executive Order has been publicized to establish RREA, thelack of ratification of legislation is a major limiting factor. The key risks to procurement and the proposed action plan to address the deficiencies in the assessment are detailed below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Key Risk** | **Risk Mitigation Actions** | **By Whom** | **By When** |
| 1 | Lack of ratification of the relevant legislation to permanently legitimize the existence of RREA and make it operational as a Government Agency. | Need for greater efforts at lobbying the relevant Government circles and the legislature to expedite actions required to be taken towards publication of the relevant legislation. | The supervising Ministry and the currently recruited staff of RREA | January 2012 |
| 2 | The lack of evidence that the Procurement Specialist has worked with some donor guidelines, e.g. those of the World Bank and therefore has relevant experience for the management of donor funded project’s cycle. | Need for the Procurement Specialist to continue gaining relevant experience, in the interim, by networking with colleague PSs on IDA projects and providing some procurement support to the Ministry of Mines, Land & Energy, for its on-going IDA projects. | By and through the initiative of the Director of RREA | As soon as possible |
| 3 | The currently low number of key staff of the Agency, which limits flexibility in staff use for backup support purposes, e.g. for procurement | There is need to avoid recruitment delays in the process that has already started. | Director of RREA and the Procurement Specialist | As soon as possible |

The overall project risk for procurement at RREA is moderate.

/ /

1. Power demand occurring between peak and off-peak periods. [↑](#footnote-ref-1)
2. The ESW concluded that grid-connected demand in Monrovia could reach 36 MW considering a low growth scenario and 59 MW in the high growth scenario in 2015. Similarly, the management contractor estimated that the connection of new 33,000 costumers will represent a demand of 48 MW in the five-year contract in order meet the existing and new demand. [↑](#footnote-ref-2)
3. **Please indicate whether the indicator is a Core Sector Indicator (for additional guidance – please see** <http://coreindicators>**).** [↑](#footnote-ref-3)
4. **UOM = Unit of Measurement.** [↑](#footnote-ref-4)
5. **For new indicators introduced as part of the additional financing, the progress to date column is used to reflect the baseline value.** [↑](#footnote-ref-5)
6. **Target values should be entered for the years data will be available, not necessarily annually. Target values should normally be cumulative. If targets refer to annual values, please indicate this in the indicator name and in the “Comments” column.** [↑](#footnote-ref-6)
7. **All projects are encouraged to identify and measure the number of project beneficiaries. The adoption and reporting on this indicator is required for investment projects which have an approval date of July 1, 2009 or later (for additional guidance – please see** <http://coreindicators>**).** [↑](#footnote-ref-7)
8. Options for the Development of Liberia’s Energy Sector, World Bank, 2010. [↑](#footnote-ref-8)
9. See <http://www.lightingafrica.org/specs.html?layout=item> for list of products that currently pass the Lighting Africa Quality Assurance requirements and Performance Targets. Additional lights that are presently undergoing testing may be added to the approved products list. [↑](#footnote-ref-9)
10. In order to provide a common base, energy consumption was converted to equivalent kWh. In the case of lighting, because the quality of light provided per lamp-hour varies widely among different types of lighting appliances, this also entailed a conversion of lamp-hours to lumen-hours. Lumen-hours of light were converted to equivalent kWh using the sample’s average ratio of kWh to lumen-hours. This means that the kWh of consumption by non-electric lighting appliances refers to the kWh of electricity that would be required to produce an equivalent amount of lighting – not to the kWh equivalents of the fuel consumed. [↑](#footnote-ref-10)
11. Road shows will be the main marketing vehicle to ensure dissemination of solar lights. Leading up to road shows, radio advertisements will alert Liberians of the schedule and areas to be visited, and how to take advantage of the program. The road shows will be very festive events, and will include the retail partners that have market representation in the area to be visited. Road shows will only be conducted in the areas that retailers have a presence, to ensure the effort results in ongoing sales. In areas with more than one retailer represented, all applicable retailers will be included in the road show.

    Road shows will be scheduled to occur on market days in targeted towns. In Liberia, market days rotate in contiguous towns and villages to allow local traders to make sales every day of the week. Similarly, road shows will target a contiguous area to, over several days, take advantage of the large number of consumers present in a defined geographic area. Each retailer will set up a temporary sales stall, and promoters will host a fun and informative session with music and dancing, followed by an introduction on Lighting Africa, the lantern exchange program, and solar products. Retailers will be on hand to make sales and demonstrate products, and will collect the exchanged inferior products at the time and place of sale. These will be disposed of. [↑](#footnote-ref-11)
12. Procurement will be carried out using the direct contracting method, which is warranted in cases where “the required equipment is proprietary and obtainable only from one source” (per the World Bank’s Guidelines on Procurement of Goods, Works, and Non-Consulting Services (January 2011)). Since products are limited on the first level to those that have passed the Lighting Africa quality assurance program, and on the second level to those that fall within the budget and mid-range categories, there are only a few products that currently qualify. Furthermore, the procurement process must allow for selection of more than one product in order to allow for competition among the retailers, making procurement of the products non-competitive beyond pre-qualification. Finally, ensuring the use of more than one product in the trial phase helps to hedge against limited availability of products in future stages should one or more retail partners decide not to pursue the relatively undeveloped Liberian market. Therefore, several firms will be invited on an equal basis through direct contracting to provide the approved lights for the program. [↑](#footnote-ref-12)
13. The RREA must obtain the requisite duty and GST waivers from the Ministry of Finance prior to placing the first order. [↑](#footnote-ref-13)
14. The cost of the solar lantern from the manufacturer to the RREA is not counted in the balance sheet as shown in the figure, rather, the RREA balance refers to the project-specific revolving capital fund. In this way, both the RREA and the retail partner end up with a positive balance sheet, which forms the basis for both to facilitate and carry out (respectively) future sales. [↑](#footnote-ref-14)
15. Uniross. 2007. Study on the Environmental Impact of Batteries. <http://www.smarterproducts.co.uk/acatalog/pdf_UNIROSS-Study-Environmental-impact-of-batteries.pdf>. See also Climatop. 2010. CO2 balance: batteries. <http://www.climatop.ch/downloads/E-Fact_Sheet_Migros_Batteries_v5.pdf>. [↑](#footnote-ref-15)
16. See Climatop, 2010. [↑](#footnote-ref-16)
17. We are using the weighted average cost of capital (WACC) as the discount rate. As the project would be 100% financed by IDA debt, the WACC is less than 1%. [↑](#footnote-ref-17)