# PROJECT INFORMATION DOCUMENT (PID)
# CONCEPT STAGE

Report No.: PIDC23146

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| **Project Name** | Liberia Renewable Energy Access Project (P149683) |
| **Region** | AFRICA |
| **Country** | Liberia |
| **Sector(s)** | Hydropower (40%), Other Renewable Energy (40%), Transmission and Distribution of Electricity (20%) |
| **Theme(s)** | Infrastructure services for private sector development (50%), Rural services and infrastructure (50%) |
| **Lending Instrument** | Investment Project Financing |
| **Project ID** | P149683 |
| **Borrower(s)** | Ministry of Mines, Lands, and Energy |
| **Implementing Agency** | Rural and Renewable Energy Agency |
| **Environmental Category** | B-Partial Assessment |
| **Date PID Prepared/ Updated** | 30-Jun-2015 |
| **Date PID Approved/ Disclosed** | 16-Jul-2015 |
| **Estimated Date of Appraisal Completion** | 18-Sep-2015 |
| **Estimated Date of Board Approval** | 22-Jan-2016 |
| **Concept Review Decision** | Track II - The review did authorize the preparation to continue |

## I. Introduction and Context

### Country Context

1. Between 2006 when President Ellen Johnson Sirleaf took office for the first time and 2014 when the Ebola crisis struck, Liberia made substantial progress in recovering from the 15-year civil war. The economy grew steadily, at an average rate of 7.3 percent peryear from 2009-2013. This performance showed the country's potential for sustainable economic growth and development. However, the economy remained vulnerable to external shocks given its dependence on primary commodities, imported foods and fuel, its limited diversification and the volatility of commodity prices. Inequality remained high and is exacerbated by the dearth of infrastructure and social services nationwide and by the asymmetry of the reconstruction efforts, mainly focused on Monrovia where a fourth of the population lives. The Ebola crisis has increased these vulnerabilities.

2. The announcement on May 9, 2015 by the World Health Organization that Liberia is Ebola free means that the Government's attention can gradually return to development efforts. It is clear that the Ebola crisis caused substantial loss of lives, dampened economic activity, and intensified social and political tensions in Liberia; it is not yet possible to fully assess the impact of the crisis or to be certain that it is over.

3. However, with the return to development efforts, increased electricity services are more urgently needed than ever to support the country's economic transformation and to improve the lives of the population. Liberia has one of the world's lowest rates of electrification at less than two percent, combined with one of the highest electricity tariffs (US$0.52/kWh). Expanding access to reliable and affordable electricity supply is a high priority of Liberia's Agenda for Transformation 2012-2017. It includes a US$3.3 billion infrastructure investment program to overcome the constraints imposed by the lack of access to basic services. Expansion of the electricity sector, a key driver of transformation, is a major component of this program.

4. The Government's economic and social development programs aim to benefit both urban and rural populations and to reduce disparities in their services. About 71 percent of Liberia's population is considered rural, representing about 2.5 million people. The majority of rural households are engaged in subsistence farming and/or petty trading as their main source of livelihood, with little or no cash income. Therefore, rural areas need improved social services and infrastructure—especially access to energy—along with enhanced income-generating activities.

**Sectoral and Institutional Context**

5. Following the end of the Liberian civil war, the Liberia Electricity Corporation (LEC) resumed operations in 2010, focused initially on re-establishing service in Monrovia. Donors, including the World Bank, financed a number of electricity sector investments including installation of emergency, diesel-based generation plants of 22.6 MW and reconstruction of a basic distribution network together with connections for low-income customers. These investments were accompanied a five-year management contract financed by Norway and signed in 2010 between LEC, the Ministry of Lands, Mines, and Energy (MLME), and Manitoba Hydro International (MHI), aiming to improve LEC's performance and to expand the customer base within the capital. LEC's customer base increased from 2,469 customers in July 2010 to 29,900 customers in December 2014.

6. In 2012, the Government adopted an ambitious strategy to increase electricity coverage to 70 percent of the population in Monrovia and 35 percent nationwide by 2030. To achieve the targeted expansion of electricity services by 2030, MLME is following a two-pronged strategy: (i) expansion of service in Monrovia and priority economic corridors; and (ii) development of decentralized electricity service that would provide electricity to important areas of the country that will not have access to the national grid. In those areas without access to the interconnected grid, distributed generation and stand-alone systems based on renewable energy technologies are sound strategies for electricity provision for medium-term economic and social development.

7. The Government, with the support of donors, developed in parallel important initiatives for the provision of electricity and lighting services in rural areas and small towns that could not be expected to be served by the national grid in the medium-term. In 2010, the Government established the Rural and Renewable Energy Agency (RREA) to promote rural electrification and use of renewable sources of energy in Liberia. RREA aims to facilitate the economic transformation of rural Liberia by accelerating the commercial deployment of modern and renewable energy services

in rural areas. The RREA's principal functions include the planning and financing of projects to be implemented by public, private, and community developers. Facilitating the financing of projects includes managing a Rural Energy Fund (REF) that will provide low interest loans, loan guarantees, and grants as targeted subsidies to ensure energy access by the poor. The Law on Rural and Renewable Energy establishing RREA as permanent public institution and providing the legal framework for developing renewable energies and expanding electricity services to rural areas was submitted to Parliament in 2011, and although the Senate approved it in March 2014, it awaits final Parliamentary approval. In the meantime, the Executive Order under which RREA has been operating has not yet been renewed in 2015, leaving RREA in a state of legal uncertainty."

8. RREA has carried out pilot activities to provide decentralized electricity, including: (i) a first mini-grid commissioned in May 2013 based on a micro-hydropower plant of 60 kW in Yandohun, funded by the World Bank; (ii) two micro-hydro and biomass-powered mini-grid pilots under implementation with support from USAID; and (iii) the Lighting Lives in Liberia Project with World Bank and GEF support.

9. The Lighting Lives in Liberia project, underway since 2012 with a budget of US$2.0 million, aims to provide basic electricity services to people unable to connect to the national grid or a decentralized grid. It seeds the off-grid lighting market through a lantern program, which would include supporting commercial marketing and sales of about 100,000 solar lights while removing polluting and low-quality lanterns and products (including disposable battery-powered lights and kerosene) from household use. It effectively creates a revolving working capital fund, utilizing incoming payments from retail partners to import additional products and further support the expansion of the market.



10. As shown above, Liberia has renewable energy potential for electricity generation that is beginning to be exploited. Hydropower potential exists in some of the major rivers of the country although it is highly seasonal, with large variations between wet and dry seasons. Solar potential shows good prospects for photovoltaic (PV) systems with a global horizontal irradiation similar to Spain. While traditional biomass meets the energy needs for cooking and heating of 90 percent of the population, use of biomass for electricity generation has been limited. Logistical challenges in gathering and transporting biomass fuel, pricing and competing uses explain the difficulties in using biomass for power generation. Finally, global and regional wind maps indicate that wind resources are likely to be poor.

11.In 2014, RREA prepared the Liberia Investment Plan for Renewable Energy (IPRE) under the guidance of MLME and with the support of the World Bank and the African Development Bank (AfDB). IPRE, a requirement for Liberia to receive funding from the Scaling Up Renewable Energy Program in Low Income Countries (SREP), provides a roadmap for scaling up renewable energy to increase access, reduce over-reliance on imported fossil fuels, and strike a balance between electricity provision to urban and rural areas. It identifies priority investments to expand rural electrification and promote the use of renewable energy. RREA and its consultants prepared the plan in consultation with communities, NGOs, development partners and the private sector, including plantation companies, mines and local banks. The two priority choices that emerged were: (i) mini-grid systems based on small hydro and biomass, backed up by photovoltaic (PV) systems to compensate for seasonal variation; and (ii) stand-alone solar systems, which include solar lanterns, other pico-PV products and Solar Home Systems (SHS).

12.Based on IPRE and on the consultations with RREA, the proposed Liberia Renewable Energy Access Project, (LIRENAP), focuses on the development of decentralized electricity generation and establishment of mini-grids to expand electricity access in areas beyond the reach of the national integrated grid, using mainly renewable sources of energy. It has been defined in coordination with Norway, AfDB, the European Union (EU), USAID and other development partners contributing to the expansion of electricity in remote parts of the country.

**Relationship to CAS**

13.The proposed Project is fully aligned with the World Bank Group Liberia Country Partnership Strategy (CPS) FY2013-17. The CPS places a strong priority on expanding electricity services and making them more affordable to businesses and households in order to spur economic growth, job creation, and poverty reduction. Achieving such expansion of services at affordable cost also contributes to the Bank's twin goals of reducing extreme poverty and sharing prosperity.

14.The CPS supports the efforts of the Government to reduce infrastructure gaps and increase access and connectivity. In each of the key sectors, including energy, the strategy is to expand the delivery of results in both rural and urban areas by building infrastructure and increasing access. Improvements in electricity infrastructure will facilitate improved access to key social services such as health and education for the poorest Liberians. The CPS mentions SREP as one of the instruments to support the country to increase access to affordable and reliable electricity for businesses and households in priority areas outside of Greater Monrovia, using renewable energy that will contribute to the overall sustainability and security of the sector.

15.The proposed Project is also aligned with the Government's development strategy, the Agenda for Transformation. Under pillar 2 of the Agenda, the expansion of electricity services and the reduction of the cost of electricity are identified as essential conditions for achieving and sustaining economic transformation. Expansion of electricity access will be critical to address both short-term needs of health, education centers, water treatment plant, and other critical facilities, as well as to support the economic and social recovery of the country. The proposed Project will further contribute to the Government's efforts to rebuild the economy in a post-Ebola situation. The proposed area of intervention of the Project is Lofa County, where Liberia's Ebola outbreak started.





## II. Proposed Development Objective(s)

**Proposed Development Objective(s) (From PCN)**

16. The Project Development Objective (PDO) is to increase access to electricity and to foster the use of renewable energy sources.

**Key Results (From PCN)**

17. Progress toward achieving the PDO would be measured by the following indicators:

- People provided with access to electricity under the project by household connections- Off-grid/ mini-grid (Number)
- People provided with access to electricity under the project by household connections- Other Renewable Energy – Off-grid (Number of households with Stand Alone Solar System)
- Number of direct project beneficiaries (of which females)
- Generation Capacity of Renewable Energy (other than hydropower) constructed under the project (MW)
- Generation Capacity of Hydropower constructed or rehabilitated under the project (MW)

## III. Preliminary Description

### Concept Description

18. The proposed Project would support the implementation of the Liberia Investment Plan for Renewable Energy (IPRE) prepared by the Government in October 2013. The financing plan of IPRE amounts to US$178.5 million. Other financing sources for the IPRE will include AfDB, Government of Norway, USAID, the EU, and the Government of Liberia. The Project would also support the scale-up of the Government's initiative to foster the creation of a market in Liberia for modern solar lanterns that will provide sustainable lighting solutions to improve living conditions of the population. Other financing sources to foster the market of modern solar lanterns include the EU and the Government of Liberia.

19. The proposed Project would finance three main activities. First, the Project would finance the implementation of decentralized electrification through mini-grids in Lofa County, in the North-West of Liberia. Second, the project would finance the elaboration of regulations for decentralized electricity services. Third, it would support the market for scaling-up of stand-alone solar systems.

The proposed Project components are the following:

20. Component 1. Decentralized electrification in Lofa County (estimated cost US$23 million). This component would finance investments in renewable generation with diesel back-up, and in mini-grids to distribute this electricity to the local population. Financing would be provided for installation of facilities, implementation of safeguards measures, and operation and maintenance (O&M) services. This component will be targeted at the North of Lofa County, a rural economic and agricultural hub on the border with Guinea and Sierra Leone. The capital of this county is Voinjama. This county is more than 200 km from the national grid; there are no prospects in the medium term to provide service to this area from the national grid that serves Greater Monrovia. Currently, households and businesses in this area do not have any electricity services or have limited, unreliable and expensive electricity supply from informal diesel generators.

21. Subcomponent 1A: Investment in decentralized generation and hybrid minigrids in Lofa County. This subcomponent would finance installation of hybrid mini-grids, possibly using the options of hydro, PV, and diesel generation plants in combinations that are still under evaluation. Support would be provided to: (i) a hybrid generation plant and mini-grid in Voinjama (estimated 50,000 inhabitants); and (ii) a hybrid generation plant and mini-grid to serve Zorzor (estimated 30,000 inhabitants). Financing would include the generation facilities as well as distribution lines and connections for households and small businesses, and the choices of generation technologies will be finalized during Project preparation.

22. Subcomponent 1B: Operation and maintenance contracts to ensure the sustainability of the rural electricity mini-grids established in Subcomponent A. This subcomponent will finance the technical assistance needed to define the best business model for the sustainable operation and maintenance of the hybrid mini-grids, to ensure the sustainability of the provision of electricity services in this remote region, isolated from the national grid. The selection of this business model will be grounded on a sound business plan and on the new legal framework of the sector (see component 2). Technical assistance will also be used to define the tariff needed to be charged to users that will ensure the sustainability of the services once they enter into operation. Another important aspect that will be defined through the technical assistance will be the ownership of the

assets after they have been built and have started operations. RREA, with the help of international consultants financed by USAID, has already begun work on the ownership and business models for commercialization of the systems based on a menu of possible options (e.g., public rural utility, cooperative, private operator and hybrid business models). Technical assistance provided under this component will build on this work.

23. Component 2: Technical assistance for rural electrification regulations and project implementation (estimated cost US$1 million). This component would finance assistance to develop the regulations for decentralized electricity services to complement the new Electricity Law and the sectoral regulatory framework currently being finalized. This component would also support preparatory studies for future investments, capacity building, and Project implementation support.

24. Subcomponent 2A: Regulation of decentralized electricity service using isolated grids. The new Electricity Law and regulations focus mainly on the national grid. Areas not reached by the national grid are not regulated and rely on informal service providers that offer expensive and unreliable service based on small diesel generators. This subcomponent would support the development of regulations for isolated mini-grids. These regulations would develop the technical and financial standards and mechanisms for the establishment and operation of the decentralized mini-grids and for monitoring their performance, possibly including models of O&M contracts and concessions with private operators and developers. It would also establish the quality-of-service, technical, and safety standards of isolated grids in Liberia. Equally important, these regulations would include transitional clauses to ensure a smooth transition in the longer term between the current isolated nature of the mini grids and the new situation that will arise when the national grid will reach these communities in Lofa County.

25. Sub-Component 2B: Preparatory studies to develop a pipeline of rural electrification projects. This subcomponent would support the preparation of decentralized rural electrification investment projects to build a robust pipeline for future funding. The studies would cover project preparation activities such as pre-feasibility studies, demand assessment, energy systems optimization, etc.

26. Sub-Component 2C: Project Implementation support and capacity-building. The proposed Project would support the strengthening of the technical capacity of RREA and MLME in areas related to rural electrification and renewable energy, mainly in planning, policy, regulation, project identification, and project implementation. Other stakeholders like LEC, local authorities and community members, and private companies would also benefit from capacity building with respect to such rural electrification systems.

27. Component 3. Market development of stand-alone solar systems (estimated cost US$1 million). This component would finance the scaling-up of the GEF-financed and World Bank administered Lighting Lives in Liberia activity that has been underway to supply pico-PV products in Liberia since 2012. It would further develop the distribution, marketing, and sale of pico-PV products and scale up into supporting plug-and-play SHSs on a broad national scale by assisting the transfer of the solar products procurement and importation from RREA to commercial importers/ distributors. Under this component, the proposed project would create a credit facility providing access to working capital to importers/distributors to incentivize the engagement of a commercial actor to procure the products and distribute to the 15 retailers operating in the country. The establishment of the credit facility is considered a crucial step to transition from a small, public-

sector initiative to a sustainable, private-sector led and commercially viable market for solar products (implementation arrangements are to be defined during preparation). The allocated amount will be used as a capital endowment for the credit facility, and during preparation the team will look for additional funding to cover financing costs and technical assistance to the financing institutions and the importers/distributors interested in participating actively in this market.

28. The proposed budget of the Project by component can be found below:

Component 1: Decentralized electrification in Lofa County - US$ 23 million
Component 2: Technical assistance for rural electrification regulations and project implementation - US$ 1 million
Component 3: Market development of stand-alone solar system markets - US$ 1 million
TOTAL US$ 25 million

Project readiness

29. Technical aspects. An initial preliminary cost estimate has been made, but feasibility studies are needed to assess the costs of the distribution lines and connections as well as the hybrid power plants. Building on the list of investment projects identified as priority ones in the IPRE, a pre-feasibility study of four potential sites has been completed in May 2015, and MLME has also completed the prefeasibility analysis of several other potential generation sites. Feasibility studies (including preparation of bidding documents) will built on the results of this analysis and will be financed by ongoing IDA projects. They are expected to be well advanced by the end of December 2015 and finalized by the end of February 2016. An energy demand analysis for Voinjama and Zorzor is underway and will be finalized by the end of June 2015. Concerning the Component 3 market development of stand-alone solar systems, the consultancy that will define the financing options and the investment needs as well as the implementation arrangements will start in July 2015 and will be validated by the GoL by the end of September 2015.

30. Safeguards. The safeguard category recommended for the Project is “B” as the type of interventions foreseen would not have major impacts on the population or the environment. RREA will prepare an Environmental and Social Management Framework (ESMF) based on the results of the pre-feasibility studies, since the exact locations of the Project facilities are not yet known. It will also prepare a Resettlement Policy Framework (RPF) to address potential land acquisition and/or resettlement issues and/or losses of assets or access to resources. The ESMF and RPF are expected to be prepared by the end of June 2015. They would be approved by the Agency for Environmental Safeguards (EPA) and by the World Bank, and disclosed in the country and at the Bank InfoShop prior to appraisal.

31. The ESMF and RPF will then guide the elaboration of an Environmental and Social Impact Assessment (ESIA), and of a Resettlement Action Plan (RAP), which will be carried out during project implementation when the feasibility studies would have been finalized and the location of the hybrid mini-grid facilities would have been known.

## IV. Safeguard Policies that might apply

| Safeguard Policies Triggered by the Project | Yes | No | TBD |
|---|---|---|---|
| Environmental Assessment OP/BP 4.01 | x | | |

| | | | |
|---|---|---|---|
| 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 | | × | |

## V. Financing (in USD Million)

| | | | |
|---|---|---|---|
| Total Project Cost: | 25.00 | Total Bank Financing: | 0.00 |
| Financing Gap: | 0.00 | | |

| **Financing Source** | **Amount** |
|---|---|
| Borrower | 0.00 |
| Strategic Climate Fund Grant | 25.00 |
| Total | 25.00 |

## VI. Contact point

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