Public Disclosure Authorized

# Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 04-Jun-2020 | Report No: PIDC28709

## BASIC INFORMATION

### A. Basic Project Data

| Country | Project ID | Parent Project ID (if any) | Project Name |
|---|---|---|---|
| Liberia | P173416 | | Liberia Electricity Sector Strengthening and Access Project (LESSAP) (P173416) |
| **Region** | **Estimated Appraisal Date** | **Estimated Board Date** | **Practice Area (Lead)** |
| AFRICA | Nov 02, 2020 | Jan 25, 2021 | Energy & Extractives |
| **Financing Instrument** | **Borrower(s)** | **Implementing Agency** | |
| Investment Project Financing | Ministry of Finance and Development Planning (MFDP) | Liberia Electricity Corporation (LEC), Rural and Renewable Energy Agency (RREA) | |

**Proposed Development Objective(s)**

increase access to electricity in Liberia and improve operational efficiency of LEC

## PROJECT FINANCING DATA (US$, Millions)

### SUMMARY

| | |
|---|---|
| **Total Project Cost** | 35.00 |
| **Total Financing** | 35.00 |
| **of which IBRD/IDA** | 35.00 |
| **Financing Gap** | 0.00 |

### DETAILS

**World Bank Group Financing**

| | |
|---|---|
| International Development Association (IDA) | 35.00 |
| IDA Credit | 35.00 |

| Environmental and Social Risk Classification | Concept Review Decision |
|---|---|

| | |
|---|---|
| Moderate | Track II-The review did authorize the preparation to continue |

Other Decision (as needed)

## B. Introduction and Context

Country Context

1. **Liberia is a fragile and conflict-affected country with a high vulnerability to external shocks.** Two civil wars between 1989 and 2003 effectively destroyed Liberia's basic infrastructure and social services. This has resulted in significant infrastructure deficit and poor living conditions for a majority of the population. After continuous economic contraction for a quarter century, Liberia's economy began to recover in 2004 with the Gross Domestic Product (GDP) growing at an average annual rate of 7.4 percent from 2004-2013**.** However, the outbreak of the Ebola Virus Disease (EVD) in 2014 and a sharp decline in global prices for two of the country's main exports (iron ore and rubber) disrupted Liberia's economic recovery resulting in a decline of real GDP growth to 0 percent in 2015. An incipient recovery began around 2017/18 but was short-lived. Liberia's economy is estimated to have contracted by 1.4 percent in 2019 and it is projected to contract further by 2.5 percent in 2020 due to the adverse effects of COVID-19. Headline inflation reached an all-time high of 24 percent (y/y) in June 2018 up from 10.8 percent the previous year, and it is expected to remain high in FY2020. Overall fiscal deficit reached about 6.2 percent in FY2019, up from 4.1 percent of GDP in FY2017, reflective of high public sector spending and low domestic revenue mobilization. The deficit is expected to narrow to 4.6 percent of GDP in FY2020 as the Government of Liberia (GoL) implemented strict cash management measures during July-Dec 2019 period and additional COVID-19 related expenditures are financed by donors with insignificant impact on the deficit. Public debt increased from 40.2% of GDP in FY2018 to 54.5% of GDP in FY2019, with total external debt stock, which is primarily composed of multilateral loans, reaching US$736 million (22.7 percent of GDP) by the end of 2017. The new Debt Sustainability Analysis (DSA) (draft), prepared in April 2020, continues to assess Liberia at moderate risk of external debt distress and high risk of overall public debt distress.

2. **Poverty remains widespread in Liberia, and progress on poverty reduction has been slow.** With a Gross National Income (GNI) per capita of just US$600 in 2018, Liberia is among the ten poorest countries in the world. It also has high income inequality levels with an estimated Gini coefficient of 35.5 in 2016. From 2007 to 2014, Liberia's per capita GDP growth rate averaged 3.3 percent per year, which helped reduce the poverty rate[1] from 68.6 percent in 2007 to 38.6 percent in 2014. However, from 2014 through 2019, per capita GDP contracted at an average rate of 2 percent per year, causing the poverty rate to rise to 43.4 percent by 2019. Non-monetary poverty indicators, including access to healthcare, education, and basic utilities, are also low by regional and international standards. In addition, there is an especially acute rural -urban and gender disparities, driven by unequal access to land and productive assets, infrastructure and public

[1] Liberia's poverty rate is measured as percentage of population below the international poverty line of US$1.9/ day in 2011 purchasing-power-parity (PPP) terms.

services, and markets for both goods and labor. Liberia ranks 176th out of 189 countries in the 2019 United Nations Development Program (UNDP) Human Development Index. In the 2020 *Doing Business* report, Liberia ranked 175th out of 190 economies on the overall ease of doing business[2].

3. **Lack of affordable electricity supply services is one of the major constraints to growth and poverty reduction in Liberia**. Electricity access rate in Liberia is amongst the lowest in SSA, with only about a quarter of the population having access to some source of electricity and only about 7% having access to grid electricity[3]. Even after a reduction from USc48/kilowatt hour (kWh) to USc38.5/kWh over the past three years, electricity price in Liberia is still among the highest in the world. A 2014 World Bank Enterprise Survey found that 22 percent of Librarian firms identified poor electricity access and reliability as major barriers to investment, compared to an average of 15 percent across Sub Saharan Africa.

Sectoral and Institutional Context

4. **Liberia is still at a nascent stage of rebuilding its electricity infrastructure, institutions, and human capital.** Prior to the civil war in 1989, the Liberia Electricity Corporation (LEC) had a total installed generation capacity of 191MW[4] (63MW Mt. Coffee hydro, 124MW HFO plants) serving about 35,000 households in the capital Monrovia, representing about 7 percent of the country's population. A total of 13MW from ten small isolated power systems supplied the remaining rural county capitals. By the end of the war in 2003, almost all the electricity infrastructure, including the transmission and distribution (T&D) network had been destroyed or looted. LEC ceased operation during the crisis leaving the sector non-operational. Following a peace treaty and a successful election in 2006, massive donor resources were mobilized to implement the Emergency Power Programs (2006-2012) that led to reestablishment of LEC's operations and allowed for the installation of up to 22MW high-speed diesel generators (HSDG) and reconstruction of some basic T&D infrastructures in limited areas of Monrovia.

5. **There has been modest progress on the rebuilding and reform of the energy sector following the adoption of the 2009 National Energy Policy (NEP) and subsequent amendments in the legal and regulatory frameworks.** The policy goals under the NEP include, among others, expanding the availability of electricity services on a sustainable basis and a reasonable cost with the goal of attaining universal service; balancing the affordability to customers with the need to attract capital and private investment in the sector; promoting the development of renewable energy resources; encouraging efficient use of electricity; and promoting regional and international cooperation in electricity trade and investment. The 1973 Electricity Act that established the LEC as a single, vertically-integrated national utility was amended in 2015 (2015 Electricity Law) providing for the legal and regulatory framework for the generation, transmission and distribution and sale of electricity within the country as well as the importation and export of electricity. LEC continued to be the national grid company and the transmission system operator in addition to its generation and distribution mandate while Liberia Electricity Regulatory Commission (LERC) was established as the independent regulator with the authority to licensing and setting cost-reflective tariffs. The Law also defined the role of the Ministry of Mines and Energy (MME) of developing national energy policies and master plans. The Rural and Renewable Energy Agency (RREA) was

[2] World Bank report on Doing Business: Measuring Business Regulations: 2020. www.doingbusiness.org
[3] Draft Multi-Tier Framework (MTF) Survey Report on Liberia: The World Bank
[4] Private concessionaires also had a total of about 212MW installed capacity

established in 2011[5] as an autonomous Government agency with a mandate to promote, facilitate, and accelerate the provision of sustainable energy services in the rural areas of Liberia. The capacity of all the sector institutions (MME, LERC, LEC, and RREA) are weak and will require significant institutional strengthening support beyond the ones provided currently by the Bank and other development partners including from Millennium Challenge Corporation (MCC).

6. **Liberia now has adequate generating capacity to meet its short to medium term needs**. With the support of development partners, the Mt Coffee Hydropower Plant (88 MW), three heavy fuel oil (HFO) thermal plants (38 MW) (which are cheaper alternative to HSDG), and 16200m$^3$ of HFO storage and transport facilities have been completed. This has increased the total installed generation capacity in the country from the 22MW HSDG (now partly decommissioned) to 126 MW in the wet season (from May-Dec when Mt. Coffee hydro is fully operational). With highly seasonal Mt. Coffee generation, total available generation capacity reduces to about 48MW in the dry season (Jan-April). With the expected completion of the regional transmission interconnection project between Cote d'Ivoire, Liberia, Sierra Leone and Guinea – CLSG in 2020, there would be opportunity to import at least 27MW of electricity (which can be negotiated to increase further) from Côte d'Ivoire to compliment local generation in the medium term particularly in the dry season. The peak distribution capacity during this 2020 dry season was about 46MW (up from 30MW in 2019). To meet the demand in the long-term, the least cost power generation expansion plan (the Optimization Study[6]) has identified three priority generation projects: i) 150MW hydropower development on St. Paul River (at SP2 site); ii) Extension of Mt. Coffee for 44MW additional capacity; and iii) 90MW of grid-connected solar to be deployed in phases. Detailed feasibility studies are on-going with Bank support and a strategic transaction advisor selection process is on-going as part of exploring various funding options for developing these projects.

7. **Limited T&D infrastructure, high tariffs, and lack of financing for new connections continue to constrain LEC's ability to increase its customer base and fully utilize available generation capacity to foster economic growth**. Investments for the reconstruction of the transmission and distribution networks lagged the generation projects resulting in full generation capacity at Mt. Coffee during the wet season remaining un-utilized. Currently, the transmission network consists of radial 66kV lines interconnecting four 66/22kV substations. A few backbone 22kV lines distributes power from these substations mostly along the main roads and streets without extensive reach within the communities. Limited expansion of the low-voltage network leaves a substantial part of the communities without access even though grid has technically arrived in those communities. The increased availability of Mt. Coffee hydropower in 2018, the inability of LEC to meet connection demands of a people desperate for electricity (including large customers), and the lack of effective revenue protection programs particularly for the large users, created an opportunity for massive illegal connections and power theft. This resulted in a sharp rise in aggregate technical and commercial (AT&C) losses from about 35% (in December 2017) to a staggering 63% currently. High system losses, limited customer base, and relatively high general and administrative expenses of LEC have left it in a precarious financial position despite the very high tariff (USc38.5/kWh) and availability of cheaper sources of power (Mt. Coffee hydropower as well as the relatively cheaper HFO replacing high cost diesel generation). Against an operating revenue of US$25.4m in FY18 (up marginally from US$24m in FY17), after accounting for fuel costs and all other operating costs of US$US$49.3m (up from US$39.8m in FY17), the operating losses of LEC stood at US$23.7m in FY18 (up from US$15.7m in FY17). Cash flow constraints at LEC has delayed the planned

[5] The Act was promulgated and submitted to the legislature in 2011 but passed in 2014 as "RREA Act, 2011"
[6] Funded from Grant Support to West Africa Power Pool under CLSG (P113266)

introduction of a life-line tariff on availability of Mt. Coffee hydropower[7]. The implementation of revenue protection programs and connecting large commercial and industrial customers could improve the revenue base, but the high tariff is a disincentive for large commercial and industrial customers to connect. In response to the rising incidence of power theft, the Government amended the penal law in 2019 to make power theft a felony with strict penalties[8].

8. **LEC has been operating under a Management Service Contract (MSC) for most of its post-war period, but operational and financial sustainability continue to be a challenge.** The first MSC was with Manitoba Hydro International (MHI) of Canada between 2010-2016 during which time the construction of the current generation plants (Mt. Coffee and HFO thermal plants) as well as the backbone transmission and distribution network was completed albeit at the tail end of their contract. The LEC Board appointed an interim Local Management Team (LMT) supported by a consulting firm, Tetra Tech (financed by IDA) as advisors[9] to fill the management gap between the expiration of the MHI contract in December 2016 and the procurement of a new MSC in December 2017. The current MSC, ESB International (ESBI) of Ireland (with funding support from the MCC) assumed management of LEC in January 2018. The 3-year contract (due to expire in January 2021) have two distinct features (based on lessons learned from the previous MSC): (i) specific obligations to update and implement a pre-defined Action Plan to improve performance with bonuses for achieving the targets and liquidated damages for non-performance; and (ii) specific requirement for a plan to train a local management team to take over at the end of the contract. While ESBI has done a relatively good job in terms of improving reliability of the network as is evidenced by the improved reliability indicators (SAIDI/SAIFI), it has not been able to address the AT&C losses and capacity building of the local staff due to a multitude of reasons including the long learning curve needed for the foreign management contractor to grasp the realities on the ground in Liberia, initial resistance from within LEC and from certain vested interest groups (which has somewhat been mitigated recently), and presence of a strong cartel with political backing standing in the way of addressing electricity theft. Training of the local staff has recently started under a comprehensive training plan funded by the MCC.

9. **Fourteen years of civil war destroyed not only the electricity infrastructure but also the human capital in LEC**. Most of the experienced LEC staff did not come back after its reestablishment in 2009 and most of those that did come back have retired by now. Besides, there hasn't been a systematic recruitment and training program nationally to groom young professionals (over the years) into supervisory and management positions. This has created a deficit of a generation of competent utility experts within the country for immediate recruitment. As part of the hand-over plan of LEC management, ESBI has selected seventeen individuals (from within LEC) through a competitive process to constitute the Senior Management Resource Pool (SMRP). However, there exists skills gap within the pool to fill in all the required senior management positions and inadequate time to train those who have the potential to fill in some of the positions. A fresh

[7] Bank had supported a cost of service study in 2018, which had determined that a marginal reduction of tariff to from USc34.5 to USc31 (excl tax) and life-line tariff of USc22 would be feasible for poorer households without impacting the financial viability of LEC. However, the study was based on an average system loss of 57.7 percent for the 2018-2020 but the losses have since risen to 63 percent. The regulator is currently updating the cost of service study with current efficiency levels to determine a trajectory for tariff reduction including a life-line tariff based on clear efficiency improvement targets for LEC.

[8] This was part of the prior actions for the macro DPO approved by Bank Board in March 2020 (Liberia First Inclusive Growth Development Policy Operation, P168218).

[9] The Liberia Accelerated Electricity Expansion Project (LACEEP) had budgeted to recruit 5 individual utility experts to manage LEC post the MHI contract. However, when the Government opted for another MSC (with financing from MCC), the funds was used to finance the contract with Tetra Tech to provide advisory services to the IMT and support the smooth transition from the IMT to the new MSC.

competitive selection needs to be undertaken with a wider search to include candidates from the subregion and a systematic training needs to be ensured for those with potential within the SMRP. External management support to LEC will continue to be needed for at least another two years beyond January 2021 to manage and build the capacity of the local team for taking over LEC management. This external support could either be in the form of a continuation of ESBI as the MSC or a fresh team of internationally qualified professionals with management responsibilities. A programmatic Advisory Services and Analytic (ASA) is being planned for a number of analytical activities including a governance assessment with a view to help inform the Government decision on the transition arrangement beyond the expiry of the current MSC towards empowered local management of LEC.

10. **The country has a modest electrification goal of 70% for Monrovia and 35% for the rest of the country by the year 2030, which is being updated to match the United Nations Sustainable Development Goal (SDG7) of universal access to electricity by 2030**. Following the Government's adoption of the National Energy Policy (NEP) in 2009, several electricity demand studies have been conducted including: (i) Options For Development of Liberia's Energy Sector (October 2011)[10]; (ii) Liberia Power Sector Capacity Building and Energy Master Planning (August 2013)[11]; (iii) Least Cost Power Development Plan (LCPDP) (August 2014); (iv) The Transmission and Distribution Pipeline Projects (2016); and v) the Rural Energy Strategy and Master Plan (RESMP) in 2016 for RREA. The RESMP envisioned electrification rates of 10% in 2020, 20% in 2025 and 35% by 2030 (75% of which should be from renewables) for people living outside Monrovia. This is clearly not adequate and to achieve SDG7 of universal access to electricity by 2030, a National Electrification Strategy (NES) based on geospatial analysis is being developed with Bank support[12]. The NES is expected to identify the least-cost technology options (national grid, localized grid, or stand-alone solar systems) for Liberia with the help of geospatial tools. The NES would consolidate and update the previous studies and provide for a national platform for coordinating resources from different development partners towards the goal of universal access to electricity. The proposed project will be an important contributor towards implementing the NES and help achieve the Bank's 'Energy LEAP for Africa' target of ensuring no country in Africa to be below 50 percent access by 2026.

11. **Complementing grid electrification with private sector-led off-grid solutions for remote rural Liberia will be critical for Liberia to be on a faster trajectory to universal access.** About 28% of households currently have access to some source of electricity, with only 7% of the households connected to the grid (6% in Monrovia national grid and 1% Rural). 21% of the population is connected to off-grid sources mostly local privately-owned mini-grids (14%) and solar lighting (7%)[13]. The Grid electrification program of Liberia is focused on network expansion and densification in Monrovia and surrounding counties and towns along and around the CLSG transmission infrastructure and the 3 cross-border lines from Cote d'Ivoire. Current ongoing donor funded projects including Bank-financed Liberia Accelerated Electricity Expansion Project (LACEEP, P133445), when completed by 2022, would increase the total grid electricity access to 24% (53% for Monrovia and 12% rural coverage). The pipeline projects (EU and AfDB) including the proposed project are expected to connect additional 170,000 households to the grid to bring the national grid access to 40% (about 100% in Monrovia and 22% Rural) as provided in Table 1 below. This will still leave a significant part of the population outside Monrovia without access to

[10] Source: http://siteresources.worldbank.org/EXTAFRREGTOPENERGY/Resources/717305-1266613906108/Liberia_Energy_ESW_11-4-11web.pdf
[11] Source : http://qsel.columbia.edu/assets/uploads/blog/2013/09/LiberiaEnergySectorReform_Phase4Report-Final_2013-08.pdf
[12] With funding support from the Public-Private Infrastructure Advisory Facility (PPIAF) and Sustainable Energy for All managed by the World Bank.
[13] Source: 2019 MTF Household Survey for Liberia

electricity, which will need to be served with off-grid solutions. The NES is expected to identify the areas where off-grid solutions (mini-grid or stand-alone systems) would be the least cost option.

Table 1. Grid electricity access in Monrovia and Outside of Monrovia

| Description | Monrovia | | | Rural (Outside Monrovia) | | |
|---|---|---|---|---|---|---|
| | Household | Monrovia | Country | Households | Rural | Country |
| Current Connection | 55,000 | 18% | 6% | 5,000 | 2% | 1% |
| Ongoing Donor Projects (2022) | 105,000 | 35% | 12% | 30,000 | 10% | 3% |
| New Bank Project (2025) | 140,000 | 47% | 16% | 30,000 | 10% | 3% |
| Total | **300,000** | **100%** | **33%** | **65,000** | **22%** | **7%** |

12. **Liberia has extensive renewable energy resources, mainly hydro with a 2,300 MW potential[14], biomass and about 1,712 kWh/m$^2$/year solar potential consistent across the country[15] to embark on a more ambitious off-grid agenda towards universal access**. Given the limited public funding available, private sector investments will have to be leveraged in grid connected generation and the off-grid solar space[16] to ensure an accelerated access to electricity in the rural areas. For the private sector solution to work in off-grid, effective regulatory and policy support will be needed from the Government. These would require, among others, addressing the high import duties for off-grid solar products, addressing the affordability barrier of rural population by promoting token-based Pay-as-you-go (PAYG) payment systems and reducing mobile money integration bottlenecks, developing and enforcing product standards amid poor quality off-grid solar products flooding the market. Key financial barriers include a lack of access to local currency loans for working capital and operating expenses, and longer-term loans for capital investments. The ongoing Bank project (LIRENAP, P149683) has some support for developing a market for private sector to reach rural communities with stand-alone solar products where grid extension or mini-grids will not be feasible, but the progress has been slow necessitating the need for a review of the incentive mechanisms for developing the commercial market. Considering the fact that a commercial market will not be able to reach the remotest communities in Liberia, a more concessional approach (with higher capital buy-down grant) may be needed to be explored in parallel to the commercial approach. The Programmatic ASA will inform the incentives required for the commercial market and also explore the different options to reach the remotest communities (to be identified under the NES) including designing a pilot, implementation of which will be supported under the proposed Project.

13. **Strong collaboration and support of all stakeholders, i.e., Government, donors, LEC and the general public is required to address the operational challenges in the distribution sub-sector**. The donors - KfW, World Bank, African Development Bank, USAID and the European Union (EU) are financing the reconstruction of some of the transmission and distribution networks in and around Monrovia. Even though these projects would increase customer connections, they do not have explicit densification components, a situation which could exacerbate system losses. The projects also do not have provisions for constructing dedicated feeders to critical public institutions (like hospitals) and industrial customers.

[14] Rural Energy Strategy and Master Plan, 2016.
[15] Global Solar Atlas prepared by the World Bank (www.globalsolaratlas.info).
[16] In terms of other renewable energy sources, biomass gasification has been tested in Liberia with promising results despite the challenges facing the technology. However, despite having access to an extensive coastline, Liberia's wind power potential is very low, with average wind speeds of less than 5 meter/second in most of the country according to the regional wind map by Economic Community of West African States' Observatory for Renewable Energy and Energy Efficiency (ECREEE) (www.ecowrex.org).

The LEC has prepared a Five-Year Business Plan (2019 – 2023) identifying the investment needs of US$90m by mid-2021 to address the key operational challenges and turn around the performance of the company towards financial sustainability. The plan has ambitious targets of: (i) reinforcing and saturating the network with at least 200,000 new connections to increase annual energy consumption from the current 87GWh to 533GWh whilst reducing losses from the current 63% to 30%; (ii) extensive capacity building and upskilling of local LEC workforce; and (iii) aggressive community engagement in addressing power theft. The KfW and the MCC have provided funds to support the implementation of some of the revenue protection measures but a huge financing gap remains. The Government's goal of drastic reduction in the electricity tariff and the introduction of a lifeline tariff for the poor can only be realized on successful implementation of the business plan.

14. **Most of the country's public institutions and health facilities have no access to electricity, and the few that are connected, the supply is at most times not reliable and of poor quality**. Of the about 836 health facilities in Liberia (38 hospitals, 61 heath centers and 736 clinics), only about 40 has grid electricity mostly in Monrovia. These include the Central medical store, JFK hospital Redemption, James & Davis Jim and Clara Town, Duport Rd, Benson as well as 3 quarantine centers (Star Base, Medical School dormitory and 14 Military hospital). Outside Monrovia, only 5 hospitals & 20 clinics are connected to cross-border supply. The remaining 770 health facilities has no electricity or rely on diesel generators. Electrification of the health facilities has emerged as a priority activity for Liberia as part of a COVID-19 response.

### Relationship to CPF

15. The proposed project is closely aligned with the objectives of the World Bank Group's Country Partnership Framework (CPF) for Liberia for FY19-FY24 and Liberia's medium-term development plan, the Pro-Poor Agenda for Prosperity and Development (PAPD) 2018-2023. Both the CPF and PAPD[17] identifies the expansion of electricity services and its affordability for businesses, households and public institution as a necessary intervention to address constraints to economic growth, human capital development and poverty reduction. The proposed project is also consistent with the World Bank Group's twin goals by increasing the availability and improving the quality of electricity services for economic activities, job creation, human capital development and living standards improvement. The proposed project directly supports human capital development through the provision of sustainable uninteruptible electricity services to Health facilities. The proposed project would also contribute to the achievement of one of the outcomes of Liberia's First Inclusive Growth Development Policy Operation (P168218) which is to bolster the financial sustainability of the largest state-owned enterprise (SOE) – LEC, to reduce the fiscal risks posed by the SOE sector.

## C. Proposed Development Objective(s)

16. The proposed Project Development Objective (PDO) is to increase access to electricity in Liberia and improve operational efficiency of LEC.

### Key Results (From PCN)

[17] The PAPD aims at aggressive expansion of Transmission and Distribution network in the short term to increase the country's grid electricity access from about 7 percent to 35 percent nationwide and reduce the tariff from USc38.5/kwh to USc25/kwh by 2023

17. The progress towards achieving the PDO will be measured by the following indicators:

- People provided with new and improved electricity services (number) (Bank core)
- of which female (percentage)
- Number of Health facilities provided access to electricity (number)
- Aggregate technical and commercial losses in the project area (percentage)

## D. Concept Description

18. The proposed project aims at aggressively expanding the electricity access (through grid and off grid solutions) to at least 50% of the country's population by 2025 and reform Liberia's energy sector with objective of achieving financial viability of utility LEC. The proposed total budget is US$60 million but planned to be implemented in two phases of US$35 million and US$25 million for phase 1 and 2 respectively. This proposed first phase would focus on measures aimed at electrification of health facilities as part of development of critical infrastructure for resilience against epidemics like Ebola and COVID 19 and ensuring the operational sustainability of LEC in the post pandemic recovery period. It would include provision of urgent infrastructural works such as provision of dedicated distribution feeders and hybrid solar PV/battery - diesel supply services for selected health facilities in both grid and off grid areas. The interventions in LEC's operations would support the implementation of some critical activities identified in the LEC's 5-year business plan to turnaround the financial viability of the utility. In parallel to the preparation and implementation of the first phase would be a series of ASA works to inform the Government decision on transition arrangement towards a sustainable local management of LEC, institutional reforms that would contribute to the financial viability of LEC, alternatives for institutional arrangement for extending the grid beyond Monrovia (concessions or operation and maintenance contracts), and the incentives required for developing a commercial market for off-grid solar as well as the options for serving very dispersed rural communities. The second phase will be implemented through an additional financing to scale up the grid component to support new areas for grid expansion and densification, support the provision of off grid solar electricity services to households, and continue the technical assistance to the sector institutions. The project design will include the full package with distinct implementation phases to be covered under the original scope and the additional financing scope.

**Component 1: Distribution Network Reinforcement, Densification and Access Expansion (US$23 million equivalent)**

19. The overall goal of the component is to target priority investments activities aimed at expanding the capacity of the distribution network to enable it provide quality, affordable, reliable and adequate electricity to critical public institutions (like health and water) and to about 120,000 - 200,000 households and businesses in Monrovia and surrounding counties including Buchanan City as well as implement revenue protection measures to drastically reduce the AT&C losses to a more sustainable level. The activities would include (i) upgrading and expanding the medium and low voltage lines and injection of distribution transformers (to reduce technical losses and improve supply quality), and connecting all potential customers in the catchment communities[18] (to resolve the huge service connection demands to minimize the appetite for

[18] These are areas electrified under World Bank funded projects where the networks are seriously overstretched, and transformers overloaded due to load growth resulting mainly from internal migration of the population to these areas. They include: (a) the 17 communities electrified under the GPOBA (P110723) where most of the transformers are blown due to overload and LEC have not been able to replace them; (b) the 18 communities under the LESEP (P120660) project; and (c) all the communities under the ongoing

illegal connections); (ii) implementing revenue protection measures to help in reducing the commercial losses[19]. The measures will include regularizing all the identified unmetered/illegally connected households and commercial/industrial customers and replacing faulty meters that would be identified during the network and customer data gathering and a mapping exercise (financed by MCC). When necessary, the network and transformer capacity would be upgraded to accommodate the load increase. The measures will also support bulk metering at the MV level to complement the installation of LV high security metering systems financed by KFW; and (iii) decentralizing LEC's operations (technical and commercial) into districts to bring delivery of quality electricity services closer to consumers and help it better manage commercial losses. The physical works would involve the supply and installation of MV and LV wood poles, stringing of bare and insulated conductors and underground cables, transformers and Load Break Switches, and energy meters. For the district offices, it would consist of 20-footer containerized office structures on lands within existing LEC substations at Bushrod, Garnerville, Paynesville, Kakata and Kle.

**Component 2: Off Grid Solar (OGS) Electrification (US$5 million equivalent)**

20. The overall goal of the OGS electrification component is to provide access to electricity in areas where grid is not economic (as would be identified by the NES). The first phase of the project would focus on urgent provision of OGS services to health facilities to improve their resilience against epidemics like Ebola and COVID 19. It would involve the supply and installation of battery/inverter and or Solar PV with battery storage system. The system may be in a hybrid arrangement with backup generator. The project would not finance procurement of new backup generators but for facilities with existing ones they may be rehabilitated if necessary and incorporated in the hybrid system. The activities under this component would also include maximizing use of energy efficient appliances (LED lights, inverter A/Cs, etc.). The component would also support a pilot for reaching households in dispersed rural communities where a commercial approach for OGS would not be feasible (the pilot will be designed under the programmatic ASA). The component would also support some pilot solar powered mini grid for some communities in the catchment area of the selected heath facilities. Finally, the component will include technical assistance for several activities including: (a) procurement of long term O&M contracts for UPS/battery components to ensure sustainability of systems; (b) provision of basic maintenance training for maintenance and medical staff of facilities, and local repairers[20] in the catchment areas; and (c) preparatory activities for future deployment of OGS services to households, assessment of communities to benefit from OGS mini grid in the catchment area of the beneficiary health facilities to enhance the financial viability of the O&M operators. The component would also support the implementation support of the component activities including a specialized owner's engineer to support the implementing agency and auditing.

**Component 3: Technical Assistance for Institutional reform, capacity building and implementation support to LEC (US$7million equivalent)**

21. The current ESBI MSC contract expires in January 2021. However, the local management team (LMT) expected to be

LACEEP (P133445) where there is already a deficit of over 500 transformers and 50,000. Only Buchanan would have extension to unelectrified areas.

[19]The inability of LEC to meet the increasing demand for service connections (even in areas where the network can cope) has contributed to massive meter stealing and illegal connections including for those that have legally registered but cannot be connected.

[20] The O&M training in solar PV systems would target mostly the motorbike mechanics in the catchment area of the facilities as they already have some experience. They would also be supported with solar home system to setup communication and phone charging centers and solar shops. This would help them improve their OGS skills and prepare them as potential local agents for the future O&M contractors and or OGS providers.

selected from the SMRP would not be ready to fully take over the management of LEC as most of them do not have the requisite professional and managerial skills for such senior positions and there is now inadequate time to train those who have the potential to fill in some of the positions. Therefore, LEC would continue to require the support of an external senior management team (ESMT) to run the utility and build local capacity for about 1-2 years after the current MSC to ensure smooth continuity of its operations. There is also the need to recruit qualified utility experts from within the subregion to fill positions where suitable SRMP candidates could not be found. LEC would also need to restructure[21] and decentralize its operations to bring service delivery closer to its customers which is necessary to address its high operational cost. This component would support activities aimed at reforming the operational structure of LEC and continue to strengthen its managerial and staff capacity to ensure operational sustainability. The component would also provide capacity building Technical Assistance (TA) to MME and LERC. The critical assumptions to achieving outcomes of this component are: (i) Government will agree and support the continuation of an external management team for LEC; (ii) Government will support the inclusion of non-Liberian utility experts from the Africa subregion as permanent staff of local management in the short to medium term.

22. ***Subcomponent 3A: Support for LEC Management and Staff capacity enhancement (US$5 million)***: This subcomponent would support the LEC to finance the cost of external utility managers and capacity building programs for local staff and management including: (i) the cost of the ESMT[22] that would have the managerial responsibility of LEC but work in a twinning arrangement with the LMT for about 1 – 2 years following the ESBI MSC; (ii) the cost of the sub regional utility experts[23] to fill the vacant positions in the LMT (where suitable SRMP candidates could not be found) for at about three years before they are transferred to LEC payroll; (iii) and design and implementation of a systemic training program for managers, supervisors and front line staff in all the operational areas of the LEC (building on the on-going training program funded by MCC and the training needs assessment financed by AfDB).

23. ***Subcomponent 3B: Project Implementation Support (US$1.5 million)***. This subcomponent will cover the cost of strengthening the capacity of the Project Management Team (PMT) in LEC to manage and monitor implementation of the project. It will include financing the cost of specialized consultants (technical, financial, procurement, audit, safeguards, etc.) to support the PMT, the preparation of technical designs and safeguards documents (ESCP, SEP, ESIA and RAP, etc.), and Community engagement and sensitization programs, implementation of the gender actions plans etc.

24. ***Subcomponent 3C: Technical Assistance for Sector Planning and Regulatory Programs (US$0.5 million).*** This TA would complement the MME's efforts to establish a sustainable energy department to enable it to effectively carry out

[21] A number of ASA works would be undertaken (through BB, BETF and client executed ongoing projects) during project preparation to support the Government in the structural reform of LEC including (i) the preparation of a functional organizational structure (organogram) with clear job descriptions and qualifications; (ii) reassigning staff to all positions in the organogram based on qualifications; (iii) Rationalization of the salary structure for all positions; and (iv) separating cost accounting for generation, transmission and distribution, etc.

[22] The ESMT would consist of up to 5 experienced utility managers in the key operational areas either as a firm, individual experts/local staff or a combination of both. Ongoing LACEEP funds could be used to support the procurement of the contract (preparation of TOR, RFP, evaluation, etc.) for the ESMT.

[23] The strategy is to target experience utility managers who have recently retired or about to retire. The procurement of contracts for the experts would be undertaken with funds under the ongoing LACEEP project to ensure they are ready by the expiration of the January 1, 2021

sector planning and overall oversight including Monitoring and Evaluation. It would also complement the support by other development partners (EU and MCC) to the newly established LERC to prepare the required regulatory and monitoring instruments and capacity building activities for its technical staff. The sub-component will be disbursed by LEC.

| Legal Operational Policies | Triggered? |
|---|---|
| Projects on International Waterways OP 7.50 | No |
| Projects in Disputed Areas OP 7.60 | No |

Summary of Screening of Environmental and Social Risks and Impacts

Based on preliminary assessments, the key environmental and social risks of the project may include; (i) removal of vegetative cover, (ii) erosion and water pollution, (iii) dust and noise pollution, (iv) modification of the aesthetic nature of the environment; (v) land acquisition and displacement; (vi) worksite hazards and injuries; (vii) community health and safety; (viii) labour influx and (ix) GBV risks.

Note: To view the Environmental and Social Risks and Impacts, please refer to the Concept Stage ESRS Document

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