



Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 01-Dec-2019 | Report No: PIDC27053

**BASIC INFORMATION****A. Basic Project Data**

Country Sierra Leone	Project ID P171059	Parent Project ID (if any)	Project Name Sierra Leone Electrification Project (P171059)
Region AFRICA	Estimated Appraisal Date Oct 20, 2020	Estimated Board Date Dec 10, 2020	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) Ministry of Finance	Implementing Agency Electricity Distribution and Supply Authority	

Proposed Development Objective(s)

Increase electricity access and improve sector financial performance.

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	60.00
Total Financing	60.00
of which IBRD/IDA	60.00
Financing Gap	0.00

DETAILS**World Bank Group Financing**

International Development Association (IDA)	60.00
IDA Grant	60.00

Environmental and Social Risk Classification
Substantial

Concept Review Decision
Track II-The review did authorize the preparation to
continue



Other Decision (as needed)

B. Introduction and Context

A. Country Context

1. **After more than a decade of solid economic growth (7.8 percent on average over 2003–2014), Sierra Leone’s economy contracted by 21 percent in 2015 due to the Ebola outbreak and downturn in international iron ore prices.** In March 2016, the country was declared Ebola free, after which an uneven economic recovery ensued, supported initially by agriculture and services. However, the recovery of the iron-ore-dominated industrial sector has remained slow, buffeted by low commodity prices and deferred investments.¹ Compounding the challenge of post-Ebola recovery, in August of 2017, a landslide of rare magnitude hit the country’s capital city, further disrupting economic activity and leading to significant losses of lives, productive assets, and public infrastructure. Recovery in 2016 and 2017 thus remained tepid, with economic growth remaining at 6.4 percent and 3.8 percent, respectively.

2. **Sierra Leone made significant strides in poverty reduction in the decade before the Ebola crisis, which has since been reversed.** According to the last two Sierra Leone Integrated Household Surveys (SLIHS), the share of population living below the national poverty line (roughly US\$1 per day) declined from 66.4 percent in 2003 to 53.8 percent in 2011. Projections based on the 2011 SLIHS estimated that poverty further declined to 46 percent in 2014, before increasing to over 49 percent in 2015 as the crises hit. A new SLIHS was done in 2018, and although the estimates are not directly comparable,² provisional estimate puts the overall poverty headcount at 56.7 percent. As expected, poverty is higher in the rural areas. Poverty is the lowest in Freetown, at 18.4 percent, compared with 41.0 percent in other urban areas and 72.2 percent in rural areas. Poverty is also much lower in the Western region (17.7 percent) compared to other regions: 61.9 percent in the East, 65.7 percent in the South, and 67.3 percent in the North. The country ranks 151 out of 157 on the newly introduced World Bank Human Capital Index, and the provision of basic services in health and education remains far from satisfactory.

3. **Following the end of the Ebola epidemic, the Government of Sierra Leone (GoSL) initiated structural reforms to boost productivity, restore fiscal stability, and gradually rebuild buffers.** The World Bank’s first Productivity and Transparency Support Credit Development Policy Operation (P156651), approved by the IDA Board in June 2017, supported such reforms. In addition, following the landslide and flooding of August 2017 the World Bank provided a supplemental financing (in December 2017) to alleviate human suffering and fill the resultant financing gap. A three-year International Monetary Fund Extended Credit Facility program was approved in June 2017 to help address Sierra Leone’s macroeconomic weaknesses—in particular, low revenue, elevated inflation, high public debt, and inadequate foreign exchange reserve buffers—which had been exacerbated by the Ebola crisis and a collapse in iron ore prices.

4. **Faced with an upcoming election (in March 2018), the Government was reluctant to take corrective measures to contain the deterioration in public finances and the broad macroeconomic policy environment.** Indeed, as in previous electoral cycles (2007 and 2012), spending pressures led to a deterioration in the fiscal position, governance slippages, and slow implementation of programs. In response to these concerns, the International Monetary Fund put on hold its

¹ Since 2011 when iron ore production started and up until the crisis, large-scale mining had driven growth and exports in Sierra Leone, tripling the industrial sector’s share in GDP to over 21 percent.

² This ratio may not be directly comparable to the ratio based on the 2011 SLIHS. The SLIHS 2018 analysis sets a provisional food poverty of SLL 1,919,000 per adult equivalent per year and a total poverty line of SLL 3,665,000 per adult equivalent per year. To address this divergence, the 2011 poverty estimate will be recomputed later in 2018 to reflect the new poverty line.



first review of the Extended Credit Facility Program toward the end of 2017. As the World Bank and other development partners subsequently delayed or withheld their budget support to the Government, the financing gap widened, resulting in significant build-up of suppliers' arrears (amounting to about 4 percent of gross domestic product [GDP]) as of the first half of 2018.

5. **Following the election of March 2018, a new Government assumed office on April 4, 2018, ushering in the second democratic change of party in power since the end of the civil war in 2002.** Recognizing the need to restore macroeconomic stability and improve public services, the Government has undertaken some critical steps. For the energy sector, the new Government recognizes the critical importance of increased electricity access in fostering economic development and improving people's living standards. It has started to embark on the ambitious agenda to more than double electricity access over the next decade and pay equal attention to districts and areas that are far from the main grid.

6. **One of the major binding constraints to growth and poverty reduction in Sierra Leone is lack of reliable and affordable energy (electricity) supply services.** Sierra Leone is one of the world's poorest countries. During the period of unrest (1991-2001), the country's physical infrastructure, particularly electricity, water and sanitation, and human capital was severely damaged. Despite strong post-conflict economic recovery, as of 2014, Sierra Leone ranked 181 out of 188 countries in the United Nations Human Development Index and had an estimated gross national income per capita of US\$700, placing it in the bottom of countries in Sub-Saharan Africa. In the following years, the Ebola Virus Disease (EVD) combined with the closure of the two largest iron ore mines resulted in a sharp contraction in economic growth. In early 2016, the GoSL developed an economic recovery plan, but its implementation has been quite challenging as an effective and sustainable resumption of broad-based economic growth needs to be underpinned by adequate infrastructures and human capital. According to the African Development Bank (AfDB), the country's infrastructure compares poorly to the rest of Sub-Saharan Africa, and it was ranked 46 out of 54 countries on the AfDB's Infrastructure Development Index (AIDI) in 2016. In particular, inadequate and unreliable power supply constitutes as a major barrier to the country's economic recovery and poverty reduction ambition. A recent World Bank survey of 152 private firms in Sierra Leone shows that they lost on average 11.2 percent of revenue as a result of unreliable electricity services, as compared with the average of 5.3 percent in Sub-Saharan Africa.

B. Sectoral and Institutional Context

7. **There is progress on sector reforms albeit at a very slow pace and the corporatization and commercialization of power utilities need to be completed.** The National Power Authority Act, 1982 established the National Power Authority (NPA), as a single, vertically integrated national utility. The National Electricity Act, 2011 (the Electricity Act)³ repealed the National Power Authority Act of 1982 and established two state-owned enterprises: (a) the Electricity Generation and Transmission Company (EGTC) and (b) the Electricity Distribution and Supply Authority (EDSA). EGTC is responsible for power generation and transmission at high voltage levels while EDSA is responsible for the distribution network at 33 kV to LV customer connection and for electricity sales to customers. Some progress has been made since the promulgation of the Electricity Act in 2011 with the two utilities becoming functional on January 1, 2015. Oversight of the sector falls under the Ministry of Energy (MoE) and the Electricity and Water Regulatory Commission (EWRC), which was created in 2014 by the Electricity Act and has the mandate to independently regulate the sector. The mandate of the MoE includes sector policy formulation, sector planning, and coordination. Due to the nonperformance of the former utility—the NPA—and overreliance on the funding interventions from the Government, the MoE is still involved in the day-to-day operations of the two utilities. The corporatization and commercialization of EDSA and EGTC is far from completion. EWRC, five years after commissioning, still has low institutional capacity and little influence on the sector currently. Regulatory issues,

³ Electricity Act 2011, Supplement to the Sierra Leone Gazette CXLII, No. 62, dated September 22, 2011.



including tariff setting, licensing procedures for potential developers, and technical regulation, are currently co-administered by the MoE. As a whole, the Electricity Act is far from fully implemented.

8. **Sierra Leone has one of the lowest electricity access rates in the world.** Sierra Leone's main power network now consists of a 161 kV radial single circuit transmission line (of 70 MW capacity) connecting the existing Bumbuna hydropower plant to the distribution network in Freetown. The electricity access rate is about 16 percent, with about 90 percent of the 192,000 customers located in the urban parts of Freetown.⁴ The current installed capacity connected to the main grid is about 104 MW, consisting of 50 MW hydropower (Bumbuna) and 24 MW heavy fuel oil (HFO) (Kingtom and Blackhall Road) owned and operated by the Government-owned EGTC as well as a 30 MW biomass (Adax) owned by the private sector. In addition, EDSA signed a two – three-year contract for the supply of 50 MW in the dry season and 30 MW in the rainy season from two HFO power barges owned by the private sector. However, the available generation capacity, including from the barges, is about 80 MW in the wet season and only about 70 MW or even lower in the dry season because (a) Bumbuna can supply only 10–15 MW in the dry season and in the wet season, only about 40 MW can be evacuated by the 161 kV transmission lines due to high reactive loads; (b) Adax has limited biomass; and (c) the EGTC's poor financial standing makes it difficult to maintain the HFO plants and regularly procure HFO fuel. Outside of Freetown (urban and rural), only seven of the now 13 district capitals have access to some form of electricity. They are supplied either by connecting to the shield wire of the Bumbuna 161 kV transmission line, or by small hydropower and small liquid fuel plants. The electrification rate in the vast rural parts of the country is almost zero.

9. **The limited distribution capacity and poor reliability of the distribution network are bottlenecks to expanding electricity access and improving service quality.** During the last five years, the modest investment in the distribution network under the Sierra Leone Energy Access Project (EAP, P126180), funded by a grant from Department for International Development (DFID) of the United Kingdom and administered by IDA, together with funds from the Japan International Cooperation Agency (JICA) and the Islamic Development Bank (IsDB) has helped increase the distribution network's maximum capacity in Freetown from around 40 MW to about 75 MW. It is not yet adequate to deliver all the available generation capacity in the rainy season to customers. Nearly 1,000 km LV lines/cables are dilapidated and have high technical losses and low reliability. The IDA financed Electricity Sector Utility Reform Project (ESURP, P120304/P166390) are supporting the rehabilitation and extension of the distribution network and would help increase the evacuation capacity of the network to about 130 MW and improve both the reliability and efficiency of electricity supply once when completed. The Africa Development Bank (AfDB) and DFID are supporting the rehabilitation and expansion of the distribution network in Bo-Kenema districts which will be connected to the 225 kV Côte d'Ivoire-Liberia-Sierra Leone-Guinea (CLSG) transmission line.

10. **The sector's sustainable development could be achieved through significantly improving EDSA's technical and financial performance and developing/acquiring low-cost generation.** There have been some improvements in EDSA's technical and financial performance. During the last two years, the total technical and commercial (T&C) losses have been reduced to around 36/37 percent from about 40 percent and the overall collection rate has increased from about 78 percent to about 85 percent. But the aggregate technical, commercial, and collection (ATC&C) losses are still over 45 percent and are much higher than the average losses of 20–25 percent in many Sub-Saharan Africa countries. At such high losses, the current average weighted consumer prices of US\$0.15 per kWh (excluding goods and service tax), which has declined significantly in US\$ term since November 2016 when the prices were adjusted, will not financially support the operations of any liquid-fuel-fired generation capacity. The tariff for commercial and industrial consumers is around US\$0.18 per kWh and there is not too much room for further increase. Currently, the sector's deficit is financed by the Government's budget, which is putting a lot of stress on the Government's finances. The continued reliance on the Government's budget will be challenging as the sector grows. While liquid fuel power plants are essential to meet the

⁴ July 2019 Monthly Report on EDSA Performance Monitoring Report prepared by Management Contractor.



minimum electricity service in the short term and may play a limited role in the medium term, especially as the system is adapted to integrating variable energy and during the dry season, the GoSL needs to adopt a strategy to move toward low-cost power in the future. The power from (CLSG) interconnection, scheduled to be commissioned in 2020, and possibly some solar photovoltaic (PV) plants, are expected to address the demand growth in the medium term. On the other hand, it is critical for EDSA to significantly reduce ATC&C losses. The technical losses are estimated at around 15 percent, which could be reduced by up to 5 percent through rehabilitation of the remaining dilapidated LV network and optimization of load flow to minimize overloading. The commercial losses are estimated at around 20 percent, which could be reduced substantially through replacing all outdated meters and faulty meters and ensuring meters for all new consumers and cracking down on illegal connection and meter bypassing and tampering. The collection losses could also be reduced substantially by substituting postpaid meters for the remaining large customers with prepaid meters of particularly government entities⁵ which account for about 65 percent of the total receivables.

11. Sierra Leone has the opportunity to improve its electricity supply services and expand its coverage to a wider population but also faces many challenges. On the one hand, the country needs to accelerate the development of low-cost power like hydro, to provide affordable power. On the other hand, it needs to improve the performance of the Government and public institutions, to improve the efficiency of existing generation and network assets. In addition to grid extension, the Government explores options and increases efforts to expand electrification through mini-grid and off-grid solutions in areas and communities which could not be covered by the extension of the main grid in the next decade or so. While the public utility is struggling with electricity supply in Freetown, up to now, there are no institutional mechanisms to promote private sector and local communities to provide electricity service through the development of renewable energy resources for businesses and households in small towns and rural areas. Therefore, the Government needs to develop and implement a comprehensive electrification strategy which encompass all potential solutions for electrification. New institutional model and policy framework to mobilize and incentivize the private sector and local communities to invest in and expand electrification through mini-grid and stand-alone system are yet to be finalized and implemented.

12. Adopting a least-cost development approach is critical to sustainable growth of the sector. Sierra Leone has little from fossil resources such as oil, gas, and coal but is endowed with abundant renewable energy resources, particularly hydropower and solar energy. While liquid fuel fired power plants generally have lower capital requirement and short implementation period, they have very high operating costs because of their dependency on imported fuel, which constitutes a foreign exchange drain on the country. International fuel prices also are subject to significant fluctuation as witnessed in the recent past. If capital and operating costs are added, liquid fuel fired power plants are in general much more expensive than renewable energy plants. Internationally very few countries are developing large number of liquid-fuel fired power plants to meet electricity needs. Therefore, Sierra Leone needs to develop and implement the least-cost sector expansion plan which would identify the lowest possible electricity to the economy and move the sector toward a sustainable development path. Hydropower resources have been explored, although much greater potential remains to be developed. No grid-connected solar PV project has been completed in the country. The cost reduction in renewable energy like solar provides the opportunity for both increasing the renewable energy in the generation mix of the main grid and for affordable power for local communities, small business, and households through decentralized development modalities. In view of the seasonal nature of the hydropower in the country, solar PV could complement very well with the existing and planned hydro projects as solar PV plants produce most of the electricity during the dry season when the outputs from hydropower plants are very low. The expected commissioning of the CLSG regional interconnection will provide Sierra Leone with the option to tap low cost power supply through the West Africa

⁵ This excludes entities that provide essential services like hospitals that cannot be cut off due to non-payment. Special arrangement is required to address non-payment of bills by such entities.



Power Pool (WAPP).

13. **Adopting a more transparent, predictable, and genuinely competitive process is the key to materialize private investment in the generation segment.** The Government has made it a sector strategy that investment in power generation would come primarily from the private sector and the legal framework provides for private sector participation. There have been a lot of private sector interests in investing in Sierra Leone's power generation sector. However, projects have mostly been initiated by interest groups without government planning and prioritizing and are not selected following a least-cost expansion approach. Despite the Public Procurement Act, no genuine competitive procurement process has been followed in selecting the developers. The Government's institutional framework for review and approval of projects is not transparent and its time frame is unpredictable. All these factors significantly increase risks and costs and lead to very few successes. After nearly a decade of efforts by the private sector and the Government, no private sector led generation projects have actually materialized. The Government needs to streamline the entire process from project selection and procurement to awarding, developing world-class standard documents, build credit worthiness of EDSA as offtaker of private sector generation and implement risk-sharing measures aligned to the country's risk profile.

14. **Weak institution and staff capacity of key stakeholders is a key constraint to the development of a sustainable sector.** Overall, the capacity of the stakeholders is inadequate to carry out sector planning; develop and implement sector strategies and policies; and procure, evaluate, and implement generation projects by the private sector. The NPA's endemic structural and operational challenges such as lack of adequate technical, operational, and financial management (FM) capacity has been inherited by the two newly established entities, with little change in overall staffing at all levels. Ongoing interventions such as the operation and maintenance (O&M) contract with an international firm for the Bumbuna hydropower plant owned by the EGTC and Management Contractor (MC) for EDSA funded by the IDA credit is helping improve the situation. However, the staff and institutional capacity building needs to be a continuous and long-term effort and process. The MoE Planning Department has limited staff to enable it to perform its role of policy making, planning, and monitoring of the sector. The EWRC now has the required commissioners appointed but it lacks the requisite technical staff and tools to function properly.

15. **The Government has developed a power sector development strategy to address the sector's needs and challenges but the implementation path is yet to be clearly defined.** The Government's power sector strategy consists of a number of elements: (i) aiming to rapidly scale up electricity access by more than doubling access rate by 2023 through electrification of the major towns by connecting to the national transmission grid, promoting rural electrification through mini-grid solution and standalone solar PV system for homes, public institutions and business by private sector; (ii) increasing low cost electricity supply through promoting investment in low cost generation like solar PV and hydropower and through connecting the national grid with the WAPP to facilitate electricity imports; (iii) improving the financial and operational performance of EDSA through strengthening governance and management and through implementing loss reduction measures; (iv) improving the environment for private sector investment in generation and mini-grids through improving the legal and regulatory framework; and (v) enhancing the institutional and staff capacity of the sector stakeholders (MoE, EWRC, EDSA and EGTC) through partnership with the donor committee. The implementation of the strategy has been on an ad-hoc approach due to: (i) the availability of limited public and donor funding; (ii) the tremendous challenges in attracting private sector investment because of country and sector conditions; (iii) the lack of a well-coordinated approach to address sector issues by different sector stakeholders; and (iv) the slow progress in implementing sector reform as stipulated in the Electricity Act and, particularly in the corporatization and commercialization of EDSA and EGTC.

16. **The proposed project supports the Government sector strategy and builds on IDA's sustained engagement in Sierra Leone's power sector.** IDA has been a partner in Sierra Leone's power sector with a portfolio of projects and continuing support to the Government reform agenda. It has built a close working relationship with all sector stakeholders



and has become a trusted partner with regard to policy, institutional development, and sector investment. Over the past few years, IDA has supported the following activities: (a) US\$16 million under the EAP funded by a DFID grant through the Sierra Leone Infrastructure Development Fund (SLIDF), which supported the rehabilitation of the distribution network in Freetown to increase distribution capacity and improve supply reliability; (b) the US\$40 million IDA-funded ESURP (P120304) and an Additional Financing (AF-P166390) of US\$ 50 million to further increase the network capacity in Freetown and improve the technical and financial performance of EDSA through strengthening EDSA management and financing the implementation of loss reduction investments and measures; (c) an AF of US\$59.6 million of IDA credit under the CLSG Regional Interconnector Project (P163033), which would link the transmission network in Sierra Leone with the WAPP network in facilitating power trade; (d) IDA's assistance to the Government to promote solar PV development by the private sector through both the regional initiative and a technical assistance funded by Public-Private Infrastructure Advisory Facility; and (e) technical support and policy advice on needed basis, including least cost analysis and option analysis for sector financial viability.

17. **The proposed electrification of the district headquarter towns under the project complements the ESURP and AF which focus on the country's capital.** It also complements the programs of the development partners, primarily the European Union, DFID, and nongovernment organizations (NGOs) which focus on supporting electricity access in rural villages through mini-grids. It supports the Government's efforts to double electricity access rate by capitalizing on the availability of the CLSG interconnection and targeting the major towns which have the lowest unit cost of providing electricity service and yield the highest economic and financial return. The proposed off-grid component supports the Government in addressing the barriers for the private sector to scale up the standalone home systems which has a huge market potential. The technical assistance component will: (i) further improve EDSA's financial and operational performance through deepening corporatization and commercialization, building on the progress made under ESURP; (ii) help demonstrate how private developer could be competitively procured to provide price-competitive electricity; (iii) support further development of human capital and enhancement of institutional capacity of the sector by expanding support to improving technical schools for engineers and technicians; and (iv) help demonstrate how private sector could be competitively procured to operate and expand isolated grids, building on DFID's experiences in mini-grids for rural villages.

18. **The proposed project is aligned with multi stakeholder energy sector roundtable held in October 2019 and following EDSA turnaround roundtable in November 2019** where the Government and donor groups were in consensus of the sector's priorities. The project will help addressing identified the Government's priorities on (i) doubling energy access through both grid and off grid applications and (ii) loss reduction and financial turnaround of EDSA.

C. Relationship to CPF

19. The proposed project is consistent with the Poverty Reduction Strategy Paper (PSRP-III) for Sierra Leone covering 2013–2018. Expanding and improving electricity supply is one of the strategic priorities of the Government's National Development Program outlined in PRSP-III. It continues to be a critical priority under the new Medium-Term National Development Plan (MTNDP, 2019–2023), entitled 'Education for Development'. The proposed project is in line with the Country Systematic Diagnostic (Report number 115408) disclosed on April 4, 2018, which identified electricity access as one of the priorities areas of potential intervention to address the binding constraints to increased economic growth, human capital development and poverty reduction in Sierra Leone. The proposed project is also consistent with the World Bank Group's Country Partnership Framework for Sierra Leone for FY2019-2025, currently under preparation, which reiterates the focus on energy to support growth in the extractive sector, as well as 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 supporting improvement of the sector technical schools for engineers and technicians. The proposed project directly supports three key energy sector objectives of the Government outlined in the MTNDP: (a) electrification of all district headquarters which is a key element of the country's electrification strategy; (b) the increase



of rural electrification through engagement and involvement of key stakeholder including private sector; and (c) improvement of the financial performance of the sector for sustainable development.

20. The proposed project supports the implementation of the Maximizing Finance for Development (MFD) approach laid out in the World Bank's Development Committee paper by addressing the key infrastructure deficit, lack of electricity, which is critical to attracting private sector investment in the industrial and business sectors. The proposed project also supports private sector participation in the generation segment through supporting the preparation and implementation of a competitive process for the selection of the private developer for a pilot solar PV project. The documents developed, transparent and competitive process established for selecting private sector developers will help create the conditions for the country to attract significant amount of private investments into the power sector, for which the GoSL has been struggling for over a decade without any success. The project directly supports private participation in the operation and expansion of isolated grids and supply of standalone PV systems for industrial, commercial and residential consumers. The proposed project also contributes to IDA's commitment to addressing climate change through substituting high emission liquid fuel electricity in two district headquarter towns and through promoting solar PV projects, contributing to IDA19's target to support the development of 10 GW renewable energy generation.

PROPOSED PDO/RESULTS

A. Proposed Project Development Objective(s)

21. The proposed Project Development Objective (PDO) is to increase electricity access rate and improve sector financial performance.

B. Key Results

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

- Electricity access rate increased (percentage)
- People provided with new and improved electricity services (number) (Bank core)
of which female (percentage)
- Share of industrial and commercial electricity consumption in project areas (percentage)
- Number of newly electrified schools and hospitals/clinics (number)
- Ratio of operating revenue against operating costs of EDSA
- Number of professional staff trained (number)
- Households and entities provided with standalone PV systems (number)
- GHG emissions reduced/avoided (tons)

PROJECT CONTEXT

A. Concept

1. Description

23. The proposed project is aligned with GoSL's sector development and electrification goals as stipulated in new Medium-Term National Development Plan (2019–2023), entitled 'Education for Development'. The new MTNDP aims at



increasing the country's electricity access from about 15 percent to 30 percent, including the electrification of all district headquarter towns by 2023. Although the Government has not developed a comprehensive national electrification strategy, it has conducted various studies and analysis, supported by donors, to derive a general path to gradually increase electricity access rate. The short-term target is to electrify headquarter towns of all district where the population, industrial and commercial activities are concentrated. The total population in these towns account for about 10 percent of the country's total population. Due to the population density, the unit cost of providing electricity service is less than a quarter of that in rural areas. Due to the higher share of industrial and commercial customers, the affordability of consumers as well as the expected economic benefits for electricity service are much higher. In the meanwhile, the Government has supported donors to pilot rural electrification through the development of mini-grids. The Government also supports standalone PV systems to be developed by the private sector. The proposed project will increase access to electricity for households, commercial, and industrial users, and public institutions in six of the 15 district headquarters and their surrounding communities, which currently have no access to any form of electricity, through on-grid extension and isolated/mini-grid solutions. The project also supports the extension of grid electricity to two district headquarter towns which are currently supplied by high cost and high emission liquid fuel plants. In addition, the project will support financial improvement of the sector through further sector reform, governance and management improvement of EDSA. The project also intends to support private sector participation in grid-connected solar PV development, operation and expansion of isolated/mini-grids, and provision of standalone PV systems to home, public institutions, industrial and commercial entities.

24. The project is structured around five main components: (1) electrification of six district headquarters and surrounding towns through grid connection with the CLSG or other segments of the 225 kV network; (2) electrification of two district headquarters and surrounding towns through mini-grid solution, which are not expected to be connected to for EDSA; (3) an off-grid component to promote stand-alone systems for homes, schools and hospitals/clinics; (4) the supply and installation of a Supervisory Control and Data Acquisition System (SCADA) for the distribution network; and (5) technical assistance for private sector participation, human capital development, and project implementation support.

Component 1: Electrification of district headquarters and communities through grid extension (US\$30 million)

25. There are a total of fifteen (15) districts in Sierra Leone, of which four headquarter towns (Freetown, Waterloo, Magburaka and Makeni) are already connected to the main grid, three towns (Kenema, Bo, Bendugu) are being connected through a AFDB/DFID funded project, two towns (Koidu, Port Loko) are being supplied by isolated grids through primarily liquid fuel generation, and six towns (Kailahun, Kambia, Kabala, Bonthe, Moyamba, Pujehun) currently have no electricity service of any form. The component includes: (i) construction of 33 kV lines to connect Koidu, Port Loko, Kailahun, Kambia, Kabala to the 225 kV transmission lines currently under construction; (ii) construction of a 66 kV line to connect Kailahun, passing through several towns and communities, to the 225 kV line as a 33 kV line would have voltage drop below acceptable limit and a 225 kV line is too costly to justify the demand; (iii) construction of a shield wire to connect Pujehun to the shield wire under construction to link with the 225 KV line; (iv) rehabilitation and expansion of the distribution network in Koidu and Port Loko; and (v) construction of new distribution networks in Kailahun, Bendugu, Kambia, Kabala. The project activities, both new construction and rehabilitation, in each town include: (i) 33 kV distribution lines and distribution transformers; (ii) low voltage distribution lines; (iii) service lines and connections to households, commercial, industrial users and public institution like schools and health clinics; and (iv) meters. The route selection and design of the transmission lines will be completed following detailed survey. The transmission lines will mostly connect one town to another and pass sparsely populated areas. The selection of transmission routings will aim to avoid any ecologically sensitive or protected areas and the relocation of residential houses, and if possible sited along existing public roads to minimize environmental and social impacts. The lines would be mounted mostly on poles (concrete or steel tubular) which have very small footprints ($\leq 1\text{m dia.}$) or on steel lattice structures ($\leq 4\text{m dia.}$) where land space is not a constraint. The 66 kV line would have a second 33 kV line to distribute electricity all the communities within 1km of the line. All sub-



transmission lines would have a 24 band Optical Ground Wire (OPGW) as shield wire not only for use by the utility for their communication and control purposes but also for public use to support the digitization efforts of the Government. The distribution network will be located mostly in towns and communities. The design of the distribution network and service connections will be finalized following site and customer survey. The project activities in each area will be implemented through one or more EPC contractors to be competitively procured. The construction of these infrastructure facilities will: (i) provide new electricity services to consumers in the towns and some surrounding communities of Kailahun, Bendugu, Kambia and Kabala which currently have no access to electricity; and (ii) provide low cost, more environmentally friendly and more reliable grid electricity to replace the high cost electricity generated the more polluting liquid fuel, inefficient plants.

Component 2: Electrification of district headquarters and communities through mini-grid solution (US\$13 m)

26. The component will construct the infrastructure facilities to provide new electricity services to the district headquarter towns of Bonthe, Moyamba and surrounding communities. The component includes two subcomponents: 3(a) the construction of a distribution network in each district headquarter town area; and 3(b) the construction of a mix of generation options for electricity production in each district area. For each district headquarter area, the activities under subcomponent 3(a) include: 33 kV lines, distribution transformers, low voltage distribution lines, service connections to and meters for households, commercial, industrial users and public institution like schools and health clinics. The design of the medium, low voltage lines and service connections will be finalized following detailed survey. These lines would be mounted only on poles (mainly wood). The 33 kV and 11 kV lines shall be bare or insulated (for densely built up areas) aluminum conductors, whilst the low voltage shall all be aerial bundled insulated conductors. The activities under subcomponent (b) include the construction of a mix of generation options including solar PV and battery storage. The total capacity, optimal mix of generation and siting of the PV plant and storage facilities will be determined through a least cost analysis, based on the resource availability in each project area. The project activities in each area will be implemented through one or more EPC contractors to be competitively procured. But it is likely that the generation part and network part will be implemented through different contractors. During project preparation, it will be explored whether private sector could be engaged to operate the mini-grid and also be responsible for adding new generation and extending new connections to meet the future needs in the area.

Component 3: An off-grid market development component/fund (US\$5 million)

27. Due to the very low access rate in the country, the Government will focus on electrification of major towns and communities close to the transmission lines in the short to medium term. There is a vast part of the rural area of the country which is not likely to be connected to the grid for at least ten years. This provides a huge market for off-grid option. The stand-alone PV system provides a very flexible and cost-effective solution for many homes, schools, clinics and even industrial. There are private sector players which are very interested in and active in the areas. But it is a relative new market with many challenges, including high perceived risk, very limited access to finance, lack of reliable service providers for maintenance etc. The component will address the challenges to open-up the off-grid market and help provide the conditions for scaling up the market by the private sector. This component will help develop a sustainable market for high quality stand-alone solar systems and solar lamps by increasing access to commercial financing to solar energy companies and their clients. One of the challenges facing companies in Sierra Leone is that a lot of their loans and their costs for importing products are foreign currency denominated, while the payments from their customers – and the loans they offer them – are in Leones. In an effort to increase affordability of their products, companies in the sector need local currency debt financing. The component will help setting up and operate a local-currency line of credit to provide access to finance in the solar energy market. Technical assistance to improve the capacity of solar companies to obtain commercial financing will be provided through component5. The institutional modality and implementation mechanism, including private sector role, will be developed during project preparation.



Component 4: Supply and Installation of a SCADA and telecommunication system for EDSA (US\$5 million)

28. EDSA currently does not have a central control and monitoring point to power plants and substations. System operation data are collected manually and communication for operation instruction is conducted through telephone. As a result, distribution system's reliability is very poor, and outages and disruptions are frequent. Automating electrical distributions systems by implementing a SCADA system is the one of the most cost-effective solutions for improving reliability, increasing utilization and cutting costs. Furthermore, by automating the distribution system now, EDSA will be ready to meet the challenges of integrating intermittent supply sources like solar power, which is being actively pursued, wind and other distributed energy resources (DERs). In addition to data collection, SCADA systems typically allow commands to be issued from central control and monitoring points to substations and power plants. A SCADA system will enable operators to quickly spot and address problems, help protect workers by enabling problem areas to be detected and addressed automatically. The SCADA will include advanced functions of topology calculation, state estimator, System security analysis, short-circuit current calculation, AGC function, short-term and medium-term consumption forecast and Dispatcher training simulator. This subcomponent will also support implementation of energy accounting software, which will provide real-time cost and usage comparison against on-site generation, power exchange allocation, and spinning reserves while providing power consumption and pricing profiles for reporting purposes.

Component 5: Technical assistance, human capital development, and project implementation support (US\$7 million)

29. **Sub-component 5(a).** This sub-component has several elements and will support: (i) building on the progress made in improving EDSA's management and staff capacity, further strengthening the governance and management of EDSA to achieve full corporatization and commercialization so that EDSA management has the autonomy and incentives to manage and is fully accountable for the results, while the Government agencies play their respective roles as policy maker and regulator and keep at arm length from EDSA's daily operations; (ii) the procurement of private firms for the operation, maintenance and future expansion of the two mini-grids under component 2; (iii) the development and operationalizing of the off-grid market development fund; (iv) the development of solar PV projects by the private sector through consulting service in: (a) assisting in finalizing the feasibility and associated safeguards impact assessment for selected PV projects to be developed by the private sector; and (b) supporting the preparation of documents, managing the procurement process, and assisting in bid evaluation and contracting for a private developer to develop, own and operate an additional new grid-connected PV plant; (v) the strengthening of the institutional capacity of the key stakeholders in promoting and managing the development of renewable energy and in implementing national electrification strategy; and (vi) technical assistance to support improvement of the technical schools for power sector engineers and technicians.

30. **Sub-component 5(b).** This sub-component will support EDSA to plan, design and implement electrification component, both through grid extension and mini-grid development. Institutional strengthening and staff capacity building needs for relevant stakeholders (EDSA, local communities) will be identified during preparation. It is also expected that consultant in various fields will be engaged to support project implementation.

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; and (viii) GBV risks.

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

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Note to Task Teams: End of system generated content, document is editable from here. *Please delete this note when finalizing the document.*