

PROJECT INFORMATION DOCUMENT (PID) CONCEPT STAGE

Report No.: PIDC324

Project Name	Sierra Leone Energy Access Project (P120304)
Region	AFRICA
Country	Sierra Leone
Sector(s)	General energy sector (100%)
Lending Instrument	Specific Investment Loan
Project ID	P120304
Borrower(s)	Ministry of Finance and Economic Development
Implementing Agency	Ministry of Energy and Water Resources, National Power Authority (NPA)
Environmental Category	B-Partial Assessment
Date PID Prepared/ Updated	21-Feb-2013
Date PID Approved/ Disclosed	21-Feb-2013
Estimated Date of Appraisal Completion	25-Mar-2013
Estimated Date of Board Approval	16-May-2013
Concept Review Decision	

I. Introduction and Context

Country Context

Sierra Leone is one of the world's poorest countries. Despite a decade of peace and strong economic growth since the end of the civil war, living conditions in Sierra Leone continue to be a challenge. During the period of civil unrest (1995-1999), Sierra Leone's physical and human capital was severely damaged. Physical infrastructure, particularly electricity, water, and sanitation, suffered widespread destruction and lack of maintenance. As of today, Sierra Leone ranks 180 out of 187 countries in the United Nations Human Development Index and has an estimated GDP per capita of US\$ 325, the fourth lowest in Sub-Saharan Africa. The latest poverty headcount estimates (2003) suggest that 67 percent of the population lives below the poverty line. The country has a territory encompassing approximately 72,000 km, slightly smaller than the U.S. State of South Carolina, and is home to a population of approximately 6 million, a large segment of which is concentrated in the Freetown area, with one of the region's largest and poorest urban settlements. Poverty is even more severe in peri-urban areas outside the capital city and in rural areas. Annual population growth has averaged 3.4 percent during the last decade. The high unemployment rate also poses a major challenge, compounded by the very young population's age (43 percent between the ages of 0-14).

Post-conflict recovery has been sustained, characterized by strong economic growth, infrastructure development, improvements in governance and public sector capacity building, and improved delivery of basic services. With a CPIA score of 3.3 in 2010, the country has moved beyond the threshold to be classified as fragile state. Also, it was ranked 2 among the top ten global reformers in the 2012 Doing Business report. Sierra Leone has conducted two successful elections since the end of the conflict. The third post-war elections for national, parliamentary and local levels were held in November 2012, and a smooth transition should put the country on a more secure path to peace and prosperity.

Electricity access and consumption in Sierra Leone are among the lowest in Africa. As a driver of economic growth, improving access to electricity is prominent in Sierra Leone's Poverty Reduction Strategy. Sierra Leone's limited and dilapidated power infrastructure base in generation, transmission and distribution, is a major constraint to expand electricity access in the country, which remains below 10 percent. Sparse coverage and unreliable service particularly exacerbates poverty conditions. Public electricity services are limited to selected areas. The urban distribution network operated by the National Power Authority (NPA) extends to Freetown and the surrounding Western area (Freetown Capital Western area), covering about 40 percent of the residents. The other distribution network in operation includes the isolated Bo-Kenema and Makeni systems in the south-east and north provinces of the country. In rural areas, where the bulk of the population resides, electricity access is practically non-existent.

The proposed project contributes to the achievement of the first goal of Sustainable Energy for All (SE4ALL) initiative launched by UN Secretary General Ban Ki Moon in September 2011. The goals are:

- Achieve universal access to energy, including electricity and modern cooking fuels;
- Double the renewable energy share in global energy mix; and
- Double the rate of improvement of energy efficiency.

Since its launch, the initiative has gained momentum from heads of state, corporate CEOs, and NGOs all over the world with 65 developing countries, including Sierra Leone, already "opting in" to the initiative. Along with the UN Secretary General, the World Bank President Jim Yong Kim co-chairs the SE4ALL high level Advisory Board that will have its first meeting in March 2013. The Bank has begun to mainstream SE4ALL as part of its energy operations and activities using instruments such as financing, reduction of investment risk, technical assistance, and introduction of new technologies.

Activities under the Project are well aligned with previous Bank's operations and support by other development partners. The proposed IDA operation is consistent with and provides the complementary strategic capacity building and investment resources that will help put Sierra Leone's power sector on a more sustainable footing. It is complementary to the recently approved SLIDF operation, not only because of its targeted investments in both primary and secondary networks and protection systems, but also because of the emphasis on upgrading NPA's managerial and implementation capacities. In addition, the external experts engaged by the SLIDF PMU will provide interim and ongoing support to the IDA operation. Both the proposed Project and the SLIDF Project build on and expand support provided through the Power and Water Project that closed on March 31, 2011. Investments under the power component of this aforementioned project

initiated the rehabilitation of the transmission and distribution network in the Freetown Capital Western Area, and financed initial installment of pre-paid meters. Priority investments in distribution network upgrade under the recently approved SLIDF operation were identified based on an Electricity Master Plan Study completed with support from the Japanese International Cooperation Agency (JICA) in 2009 (JICA Master Plan) and in consultation with NPA. In addition, the Project anticipates complementary investments undertaken or planned by NPA with funding from JICA and the Islamic Development Bank (IsDB).

Sectoral and Institutional Context

Electricity tariffs in Sierra Leone, remain among the highest in Africa, with the actual tariff reaching 28¢/kWh, twice as high as the continental average. In order to meet energy needs, a large majority of Sierra Leone's population is forced to rely on inefficient and polluting traditional fuels such as kerosene for lighting and fuel-wood and charcoal for cooking, resulting in adverse impact on personal health and safety as well as on the environment. Electricity represents only 7% of the total energy consumption, preceded by imported petroleum products (13%) and 80% biomass, dominated by fuel-wood. Inadequate power supply, constraints in the transmission and distribution network, inefficiencies in the performance of the national vertically integrated utility NPA, fledgling institutional and regulatory framework, and insufficient financing are key constraints to improving access to electricity.

Inadequate power supply is a binding constraint to the potential economic transformation led by the mining sector. The commissioning of the 50MW Bumbuna hydroelectric power plant (Bumbuna) in late 2009 almost doubled Sierra Leone's installed capacity and changed its power-generation mix. Today, overall installed generation capacity is approximately 82.5 MW, including two thermal power plants at Kingtom (10MW) and Blackhall Road (16.5MW) that together with Bumbuna serve the Freetown Capital Western area; and 6MW feeding the isolated Bo-Kenema system. Nevertheless, current power generation capacity remains highly inadequate to accommodate the country's overall power demand. Hydropower from Bumbuna is seasonal, producing less than 20 MW during the dry season. In addition to the generation connected to the grid and captive generation, there is an additional 174 MW from some 33,000 private diesel generators, which is a reasonable approximation for current unserved non-mining demand. A recent basic review of demand by some of the major mining companies established in Sierra Leone suggests that power needs by the mining sector may reach over 900MW in the next ten years, ten times more than currently installed capacity. This calls for a major scale-up in generation capacity but also for diversified approaches that allow for exploiting synergies in electricity supply and facilitating sharing of benefits between the public and private sector.

The lack of a national transmission and distribution grid and insufficient capacity is a severe constraint to the amount of generation that can be evacuated. Supply to the Freetown area is constrained by the limited 35-37 MW capacity of the transmission and distribution network. NPA's distribution network in Freetown area is severely constrained by insufficient transport capacity of the 11kV and 33kV lines, comprising the network. Only 35 MW-37 MW transport capacity is available in the Greater Freetown distribution network vs. 60 MW normally available power supply in the rainy season and 40 MW available in the dry season. System losses continue to be high at 38.6%. and the operation of the distribution network in Freetown area is further plagued by constant outages due to faults of the more than 40-year old network equipment, and related load-shedding, aggravated by lack of adequate fault finding equipment and experience of NPA staff. The Freetown capital area and the Bo-Kenema Power Service (BKPS) are served by isolated 33/11kV networks

operated respectively by NPA and BKPS. A 204km 161kV transmission line connects Bumbuna hydropower plant with Freetown and is operated by the Bumbuna entity, represented by the Ministry of Energy. Local distribution networks are being rehabilitated in the towns of Makeni, Koidu and Lungi in connection with the restored Diesel generators there. Moyamba's network is operational.

Government resources and capacity are stretched given the need to focus on multiple challenges, including increasing generation and identifying large sources of hydro and thermal generation, establishing interconnection with the WAPP, and attracting IPPs. The country's large hydropower generation potential (theoretically estimated at close to 2000 MW) and its strategic location in the West Africa Power Pool creates an opportunity for Sierra Leone to benefit from and contribute to the development of regional power markets. The growing demand for electricity at both domestic and regional levels, and the regional power shortages in foreseeable future provide a solid market for any additional electricity supply that can be offered. GoSL has started negotiations with various public and private organizations about the provision of about 560 MW of generation capacity. Of these, only 80 MW have been found to be feasible and confirmed through the WAPP line and 15 MW from a bioenergy producer. Furthermore, the GoSL is exploring additional opportunities to cover the remaining gap of about 450 MW until 2018-2020 with a mix of hydro and thermal generation. NPA's lack of solvency and weak management and implementation capacity make it a weak off-taker, with little ability to attract high quality project developers into the sector.

Relationship to CAS

The Proposed Project is consistent with Sierra Leone's Country Assistance Strategy for Sierra Leone. A Joint Country Assistance Strategy (JCAS) for Sierra Leone covering the period 2010-2013 was adopted by the World Bank, IFC and the African Development Bank to support the PRSP II with its two pillars: Human Development; and Inclusive Growth (focusing on energy) A recent Country Assistance Strategy Progress Report has reiterated the focus on energy as a mean to support growth in the extractive sector. Also, the Progress Report has added a third pillar on Managing the Extractives Boom and put emphasis on building capacity for improved governance and service delivery within the government and civil society. The proposed project is also consistent with the Second Poverty Reduction Strategy Paper for Sierra Leone (PRSP II) – An Agenda for Change – covering the period 2008-2012. Expanding and improving electricity supply is one of the strategic priorities of the Government's national development program outlined in the PRSP II and will continue to be a critical priority under the new Poverty Reduction Strategy – Agenda for Prosperity – for the period 2013-2017 that is currently under preparation.

II. Proposed Development Objective(s)

Proposed Development Objective(s) (From PCN)

The Project Development Objective are to: (i) increase access and reduce losses in electricity supply in Freetown Capital Western Area; (ii) improve management and implementation capacity of the National Power Authority.

Key Results (From PCN)

Key results from the Project are expected to include:

- (a) Improved capacity of the distribution network;
- (b) Reduced system losses;
- (c) Improved collection of payments for electricity consumption;

- (d) Pilot projects for improving rural electricity access developed in selected villages; and
- (e) Improved capacity of GoSL to implement power sector reforms.

III. Preliminary Description

Concept Description

Component 1: Improvement of Electricity Supply in Urban Areas

Overall losses in NPA currently stand at around 37%-40% for 2012, most of which are technical losses. The distribution grid requires well over \$170 million of investment in the Greater Freetown area alone. Some of the most urgently needed system investments are in the process of having specifications prepared under the recently approved Sierra Leone Infrastructure Trust Fund (SLIDF) energy access project.

SLIDF TA resources will be used to carry out a condition assessment of the entire Freetown distribution network and to develop a comprehensive investment plan of prioritized and optimal next investments. The plan, to be based on system studies as well as the existing JICA funded load flow study, will exactly define network sections and equipment needing urgent upgrade to remove serious bottlenecks in the system and to upgrade quality of supply, including the optimal mix of investment in primary and secondary Medium Voltage (MV), Low Voltage (LV) networks and protection systems. Apart from forming the basis for investment under the IDA project, this systematic approach will ensure a sound basis for further financing of the network rehabilitation and upgrade going forward, including from other development partners.

A major component of the IDA project will be to upgrade and rehabilitate key primary and secondary MV network infrastructure, including aged MV substations and feeder lines in the Greater Freetown area. Primary MV substations are in a state of disrepair, substation batteries and circuit breakers are mostly not functional, and DC supplies nonoperational. Sections of the system are overloaded, protection relays are faulty and there is a serious risk of infrastructure damage occurring as a result of protection system or circuit breaker failure. The envisaged upgrade will require that certain existing links to be replaced with appropriately sized cables/overhead lines, and will help reduced technical losses and enhance reliability. Appropriately matching needed investments in MV feeder upgrade to appropriate investments in corresponding substations will enable systematic system upgrade and protection of infrastructure. The upgrade will also be complementary to network investments effected under the SLIDF energy access project and will form part of a systematic approach to rehabilitate the Freetown network on an incremental basis. In particular it should be noted there has been an increase in demand in certain areas from newly established commercial operations and consideration will be given to expanding the network to meet this demand.

Quality of electricity service in Freetown is poor. Low voltage conditions caused by feeder overloading are present in most areas of the city and regular outages occur due to power shortages as well as system unreliability. Undersized transformers and excessive LV feeder lengths result in low voltage conditions. Suitable areas for secondary MV and LV system upgrade will be defined in the investment plan developed under the SLIDF energy access project, including consideration of high consumption areas in order to maximize investment benefit and positively impact the commercial performance of NPA. A \$5 million IDA investment in this area, matched by coordinated and well-targeted LV upgrade investments supported by the Islamic Development Bank Investments in LV system upgrades will be necessary to reduce technical losses and to improve customer service.

As a means to improving commercial performance, NPA has embarked on a program to gradually

replace all credit meters with pre-paid meters. This strategy has already paid dividends in terms of reduced non-technical losses and improved collection ratio. The Project will complement NPA's ongoing re-metering program by financing supply and installation of approximately 10,000 pre-paid meters. NPA currently has no means of precisely locating high loss areas in the network. Therefore, the Project will finance supply and installation of a further 500 statistical meters to complement the investment made under the SLIDF.

Component 2: NPA Capacity Enhancement and Performance Improvement

While Component 1 of the IDA operation will begin a strategic program of investment in distribution, it is not sufficient by itself to put the sector on a sustainable path. NPA itself needs to be turned around with renewed skills including in management, planning, systems, processes and implementation capacity. Improving the institutional and managerial capacity and performance of NPA is key to stabilizing and expanding the energy sector in Sierra Leone. NPA currently has good engineers, but they have insufficient project management, implementation and execution experience. There is insufficient attention to improving customer service, and barely any financial resources, tools or incentives to do so, and insufficient institutional capacity to execute its mandate.

Component 3: Enhancing Options for Power Sector Investments

Owing to the enormity of the challenges in the sector, key institutions with limited staff resources find themselves often more reactive rather than proactive, and in fire-fighting mode rather than acting strategically. These institutions are stretched to the maximum in prioritizing their scarce human resources to focus strategically on planning future directions for the sector and selecting future public and private investments in generation, transmission and distribution. Technical assistance under IDA will be provided for feasibility, assessment and/or study of the most promising opportunities in power generation, and/or related transmission and distribution, which may include major infrastructure.

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		x	
Forests OP/BP 4.36		x	
Pest Management OP 4.09		x	
Physical Cultural Resources OP/BP 4.11	x		
Indigenous Peoples OP/BP 4.10		x	
Involuntary Resettlement OP/BP 4.12	x		
Safety of Dams OP/BP 4.37		x	
Projects on International Waterways OP/BP 7.50		x	
Projects in Disputed Areas OP/BP 7.60		x	

V. Tentative financing

Financing Source	Amount
BORROWER/RECIPIENT	0.00
International Development Association (IDA)	25.00

Total

25.00

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