

# Electricity Sector Reform Roadmap (2017-2030)

6th September 2017

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# Foreword

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My Ministry has worked assiduously to introduce policies and manage an energy portfolio that will ensure the provision of reliable and affordable electricity in Sierra Leone. The Electricity Sector Roadmap has been an opportunity for comprehensive stakeholder engagement that spanned the Government of Sierra Leone, Development Partners, civil society, media and professional institutions to evaluate the actions and commitment required to achieve an energy revolution. It is this revolution that will ensure universal access to electricity by 2030 for all Sierra Leoneans.

Building the corporate culture of the entities in the sector and increasing energy efficiency and the electricity infrastructure (including massive investments in Transmission and Distribution) are key for increasing access to electricity supply. Our strategy also includes a consistent but urgent increase of power supply in an integrated approach that combines on grid and off-grid opportunities, to achieve reliable and affordable electricity for alEvery District and sector of the economy must be involved. The task is urgent if we are to make sure that we deliver on the objectives of the National Agenda for Prosperity.

Awareness is growing on the need to turn policy statements as well as our current legal and institutional framework into concrete actions. In particular, modern technologies will support electricity access goals by providing valuable services in our electricity sector. By identifying and prioritising the steps needed to accelerate the implementation of a radical electricity sector recovery and change, this roadmap will enable the Government, industry and financial partners to make the choices that will result in the desired outcomes.

This roadmap is produced under my authority as Minister of Energy with the support of the Millennium Challenge Corporation of the United States of America.

Amb. Henry Macauley Minister of Energy

# Abbreviations

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ASI	Adam Smith International
ATAF	Automatic Tariff Adjustment Formula
BOO	Build Own Operate
BOT	Build Own Transfer
CEC	Copperbelt Energy Cooperation
CIC	Centre for information and Coordination
CLSG	Cote d'Ivoire Liberia Sierra Leone Guinea
DFID	Department for International Development
DSF	Debt Sustainability Framework
ECOWAS	Economic Community of West African States
EDSA	Electricity Distribution and Supply Authority
EGC	Electricity Generation company
EGTC	Electricity Generation and Transmission Company
EPC	Engineering Procurement and Construction
ETC	Electricity Transmission Company
EUR	Euro
EWRC	Electricity and Water Regulatory Commission
FDI	Foreign Development Investment
FIT	Feed-In Tariff
FY	Fiscal Year
GBP	Great Britain Pound
GOSL	Government of Sierra Leone
HFO	Heavy fuel oil
IFI	International Financing Institution
IMF	International Monetary Fund
IPP	Independent Power Producer
IRP	Integrated Resource Planning
ISO	Independent System Operator
JICA	Japan International Cooperation Agency
Km	kilometre
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
MCC	Millennium Challenge Corporation
MCCU	Millennium Challenge Coordinating Unit
MO	Market Operator
MOE	Ministry of Energy
MOFED	Ministry of Finance and Economic Development
MW	Megawatt
NDP	Network Development Plan
NPA	National Power Authority
O&M	Operation and Maintenance
PFI	Private Finance Initiative
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PPPU	Public Private Partnership Unit
PV	Photovoltaïque
SLL	Sierra Leones
SO	System Operator

SPU	Strategic Planning Unit
T&D	Transmission and Distribution
ТРА	Third Party Access
TSO	Transmission System Operator
UNOPS	United Nations Office for Project Services
USD	Dollar of United States
WAPP	West African Power Pool
WAPP	West Amcan Power Poor

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# **Key Definitions**

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### Key definitions of activities in the Electricity Sector value chain

**Electric Public Utility**: means any provider of electricity to the public. As a result, any electricity service supplier using individual off grid technologies qualifies as a public utility and is therefore regulated (and shall receive a sales license). Any facility that has an embedded power plant for use of electricity on the same site and that does not sell to the grid (nor use the grid) does not qualify as a public utility (and therefore does not need a generation licence).

**Generation**: means the activity of electricity generation in a power plant that includes any building and plant used for that purpose; the site intended to be used for generation is part of the generation asset but does not include any station for transforming, transmitting or distributing electricity.

**Transmission**: means the transportation of electrical energy and power by means of high-voltage lines facilities and associated meters, including the construction, operation, management and maintenance of such line, facilities and meters.

Dispatch: means the activity of controlling an integrated electric system in order to:

- i. assign specific Generating Units and other sources of supply to effect the supply to meet the relevant area Demand taken as Load rises or falls;
- ii. control operations and maintenance of high voltage lines, substations, and equipment, including administration of safety procedures;
- iii. operate interconnections;
- iv. manage energy transactions with other interconnected Balancing Authority Areas; and
- v. curtail Demand

**Import**: means the delivery of electricity from another country on the transmission or distribution network of Sierra Leone.

**Export**: means the supply of electricity to another country, from Sierra Leone, through the transmission or distribution network.

**Transit**: means the transport of electrical energy through the electricity network of Sierra Leone, from a thirdparty country to another third-party country. Electricity does not always follow the intended path of seller and buyer. Unintended current in the grid of Sierra Leone may result from a transaction between two neighbouring countries that have a direct cross-border link but are also interconnected to Sierra Leone. These unintended loop currents bear a cost to the Sierra Leone transmission grid.

**Distribution**: means the transportation of electric energy and power by means of medium to low voltage lines, facilities and associated meters, including the construction, operation, management and maintenance of such lines, facilities and meters.

**Smart grid**: means an electrical grid which includes a variety of operational and energy measures including smart meters, smart appliances, renewable energy resources, and energy efficient resources. Electricity may flow in both directions in a smart grid, contrary to a conventional grid where energy always flows in one direction from the central generator down to the consumer. Smart grid technology may be implemented with mini-grids. Upgrade of a conventional grid to a smart grid may be necessary as a result of a feed-in tariff policy where multiple renewable generators inject electricity along an existing distribution grid.

**Captive load supply**: means the supply of electricity to a consumer that is located on the same site as a generator and does not need to be transmitted or distributed through the public network.

**On-grid public sale of electricity**: means the sale of electricity to the public that has been transported on the interconnected grid.

**Off-grid public sale of electricity**: means the sale of electricity to the public that cannot be qualified as "ongrid public sale". **Local service**: supply of a local service by means of the resources and infrastructure located in the territory of the same locality and excluding any encroachment in another locality.

National service: Any other service that cannot be qualified as "local service".

### **Definition of related services**

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**Voltage support**: means the injection or absorption of reactive power to maintain voltage levels in the transmission and distribution system under normal conditions.

**Frequency regulation**: means the balancing of continuously shifting supply and demand within a control area under normal conditions. Management should be done automatically, on a minute-to-minute (or shorter) basis, although, in Sierra Leone, it is currently done manually and is an obstacle for absorption of highly volatile electricity generators (e.g. large scale solar PV power plant).

**Load following**: means the second continuous electricity balancing mechanism for operation under normal conditions, following frequency regulation. Load following manages system fluctuations on a time frame that can range from 15 minutes to 24 hours, and can be controlled through automatic generation control, or manually.

**Spinning and non-spinning reserve**: Reserve capacity for the electricity supply is used to compensate for a rapid, unexpected loss in generation resources in order to keep the system balanced. This reserve capacity is classified according to response time as spinning (<15 minute response time) and non-spinning (>15 minute response time). Faster response times are generally more valuable to the system.

**Variable supply resource integration**: means the use of energy storage to change and optimise the output from variable supply resources (e.g. wind, solar), mitigating rapid and seasonal output changes and bridging both temporal and geographic gaps between supply and demand in order to increase supply quality and value.

**Demand shifting and peak reduction**: Energy demand can be shifted in order to match it with supply and to assist in the integration of variable supply resources. These shifts are facilitated by changing the time at which certain activities take place (e.g. the heating of water) and can be directly used to actively facilitate a reduction in the maximum (peak) energy demand level.

**T&D congestion relief and infrastructure investment deferral**: Electricity generation / storage technologies used to temporally and/or geographically shift energy supply or demand in order to relieve congestion points in the transmission and distribution (T&D) grids or to defer the need for a large investment in T&D infrastructure.

**Seasonal storage**: The ability to store energy for days, weeks, or months to compensate for a longer-term supply disruption or seasonal variability on the supply and demand sides of the electricity system (e.g. storing water in a high level reservoir during the rainy season for use in the dry season during peak load).

**Arbitrage/Storage trades**: Storing low-priced energy during periods of low demand and subsequently selling it during high-generation cost periods within the same market is referred to as a storage trade. Similarly, arbitrage refers to this type of electricity trade between two electricity markets.

### **Statutory Instruments**

**Licence** is the statutory instrument of EWRC (licensor) to regulate the performance of an activity of public utility by an applicant (Licensee) that would otherwise be forbidden. It requires paying a fee and proving a capability. The requirement also serves to keep EWRC informed on the exercise of the regulated activity, and to give the opportunity to set conditions, limitations and performance target. A Licence has several components beyond the authorisation itself, including a term, territory, renewal provisions, and other limitations.

**Permit** is the statutory instrument of the Ministry of Energy to authorise any legal person before the exercise of certain non-regulated activities in the sector of Electricity.

**Parliament Non objection** is governed by Subsection (7), Section 170 of Sierra Leone's Constitution, which states: "Any order, rules or regulations made by any person or authority pursuant to a power conferred in that behalf by the Constitution or any other law (a) shall be laid before Parliament, (b) shall be published in the

Gazette on or before the day they are so laid before Parliament, (c) shall come into force at the expiration of a period of twenty-one days of being so laid unless Parliament, before the expiration of the said period of twenty-one days, annuls any such orders, rules or regulations by the votes of not less than two-thirds of the Members of Parliament." The rule or regulation must then be published in the Sierra Leone Gazette within 28 days after its approval. Within Parliament, the Legislative Committee is principally responsible for reviewing the documents.

### Locations of Electricity Supply Services

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The growth of electricity supply services may be effected by connecting the consumer to the main interconnected grid. In that case, the service is a **national public service** with oversight by the central Government. In certain conditions, this is the most cost effective service that brings abundant and low cost electricity to the user point.

In other cases, when the grid is too far from the user point or when the electricity consumption of a user is too small for a cost-effective connection to the grid, off-grid services are a better economic choice. The service becomes a **local public service** with oversight by the relevant local authority. In that case, the electricity supply may be constrained by the availability of the local resource and priced at a higher level compared to on-grid electricity supply to reflect the higher cost of service as a result of lower density of electricity users and the smaller scale of the electricity technologies.

### **Public Private Partnership Arrangements**

A **Public-private partnership** (PPP) refers to an arrangement where the private sector supplies infrastructure assets and services that traditionally have been provided by the Government.

A **management contract** is a contractual arrangement for the management of a public enterprise by the private sector (e.g. EDSA with Khatib & Alami Consulting Engineers Offshore SAL). There are several variants of management contracts:

- i. supply or service contract,
- ii. maintenance contract, and
- iii. operational contract

Supply of equipment, raw materials, energy and power, and labour are typical examples of **supply or service contracts**. A private concessionaire can also enter into a number of supply or service contracts with **suppliers**. The contracting-out of non-core activities in an organisation (e.g. catering, cleaning, or security) is also known as 'outsourcing'.

**Maintenance contracts** are relatively common in utilities using diesel generators or gas turbines. It is quite common for the equipment manufacturers, or their suppliers, to operate as maintenance management contractors (e.g. Wartsila in the 128MW Western Area Generation Project).

In the simplest type of **operational contract**, the private operator is paid a fixed fee for performing operational tasks. More complex contracts may offer greater incentives for efficiency improvement by defining performance targets, and the fee structure is based in part on their fulfilment. An example of an O&M contract would include the O&M contract of Bumbuna hydro and transmission line.

**Turnkey** - or Design-Build or EPC – contract is a traditional procurement model for infrastructure facilities, and is used by both the public and private sectors. The turnkey contractor designs and builds a facility for a fixed fee, rate or total cost.

In **Lease / Affermage** contracts, the operators are responsible for operating and maintaining the infrastructure facility and services, but generally they are not required to make any large investment which remains the responsibility of the Government. In a lease contract, the operator retains revenue collected from customers and makes lease fee payments to the contracting authority. In an affermage contract, the operator and the contracting authority share the revenue.

In a **Concession** contract, the Government entity owning the public asset is the contracting authority that defines and grants specific rights to an entity to finance, build and operate a facility for a fixed period of time. In

Sierra Leone, there are three possible Government entities that own public assets of the electricity sector: The central Government, local Governments and EDSA. The Government entity may retain the ultimate ownership of the facility and / or right to supply the services. Concessions are awarded under two types of contractual arrangement: Franchise or BOT type contracts.

Under a **Franchise** arrangement, the Franchisee provides services that are fully specified in the Licence of the franchising authority. The private sector carries commercial risks and may be required to make investment. In Sierra Leone, Franchising could be an option for EDSA to develop some parts of the distribution grid using private investment (including extension of the grid into peri-urban or rural areas).

In **Build-Operate-Transfer** (BOT) contracts, the concessionaire undertakes investments and operates the facility for a fixed period of time, after which the ownership reverts to public sector (i.e., central Government for national services or local councils for local services). In BOT contracts, the Government has explicit and implicit contingent liabilities that may arise due to loan guarantees provided and default of a sub-sovereign government and public or private equity on non-guaranteed loans. By retaining ultimate ownership, the Government entity controls policy and can allocate risks to those parties best suited to bear them or remove them (e.g. 128MW Western Area Generation Project developed by CEC and taken over by Globeleq).

In **private ownership of assets**, the private sector remains responsible for design, construction and operation of an infrastructure facility and the public sector relinquishes the right of ownership of assets to the private sector. Since the same entity builds and operates the services, and is only paid for the successful supply of services at a pre-defined standard, it has no incentive to reduce the quality or quantity of services. There are three main types of contracts with private ownership of assets:

- i. Build-Own-Operate (BOO) type of arrangement,
- ii. Private Finance Initiative (PFI),

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iii. Divestiture by Licence or sale.

In **BOO** and other variants such as Design-Build-Finance-Operate, the private sector builds, owns and operates a facility, and sells the product / service to its users or beneficiaries. This is the most common form of private participation in the power sector. For a BOO power project, the power distribution company may have a long-term power purchase agreement (PPA) (also known as an off-take agreement) at an agreed price from the project operator.

In many respects, **licensing** may be considered as a variant of the BOO model. The Government grants Licences to private undertakings to provide services such as land line and mobile telephony, TV and radio, etc. However, licensing may also be considered as a form of 'concession' with private ownership of assets. Licensing allows competitive pressure in the market by allowing multiple operators, such as in mobile telephony, to provide competing services. In Sierra Leone, this model may be considered for individual off-grid electricity supply services.

In the **PFI** model, the private sector builds, owns and operates a facility, similar to the BOO model. However, the public sector (unlike the users in a BOO model) purchases the services from the private sector through a long-term agreement. PFI projects therefore bear direct financial obligations to Government in any event. In addition, explicit and implicit contingent liabilities may also arise due to loan guarantees provided to lenders and default of a public or private entity on non-guaranteed loans. PFI are used for schools and hospitals in UK, and highways in India.

In **divestiture** arrangement, a private entity buys an equity stake in a state-owned enterprise. However, the private stake may or may not imply private management of the enterprise. True privatisation, however, involves a transfer of deed of title from the public sector to a private undertaking. This may be done through either outright sale or through public floatation of shares of a previously corporatized state enterprise.

**Resources-for-Infrastructure deal**: means the financing of infrastructure projects making use of a barter deal structure known as "Angola model" or "Resources for infrastructure swap" that is usually achieved through China Exim Bank, whereby repayment of the loan for infrastructure development extended by Exim Bank is made in terms of mineral resources (for example: oil, cobalt, copper, iron, aluminium, manganese, etc.) or agribusiness production (timber, coca, etc.). Access to minerals or agro products is the Chinese equivalent of payment guarantee. Use of familiar Chinese firms and labour is the Chinese equivalent of completion guarantee. In the power sector, these deals are almost exclusively confined to large hydropower projects.

# 1. Introduction

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# 1.1. Rationale for electricity sector reform

The electricity sector in Sierra Leone is governed by the National Electricity Act (Electricity Act), 2011 and the Sierra Leone Electricity and Water Regulatory Commission Act (EWRC Act), 2011.

Both Acts provide a political and institutional framework that calls for implementing regulations and decisions of the Electricity and Water Regulatory Commission (EWRC) and Ministry of Energy (MoE) which provide the necessary details for their implementation.

The Electricity Act has made clear innovations in the institutional scheme and organisation of the electricity sector, enabling the unbundling of the formerly monopolistic and vertically integrated state company NPA and the liberalization of all activities related to public service electricity supply (generation, transmission, distribution and sale).

According to the EWRC Act, any natural or legal person holding or operating facilities **for electricity sale to the public** (therefore defined as "public utility") must apply for a Licence to the regulator. This concerns all qualified Public Utility (generation, transmission, distribution and sale) along the sector value chain.

# **1.2.** Purpose, process, and structure of the Roadmap

This Electricity Sector Reform Roadmap aims to:

- ) Increase understanding among stakeholders of the new organisation of the electricity sector and operations of the various sector activities aiming at providing public service electricity supply to all population, non-commercial services and business activities in Sierra Leone.
- ) Provide a comprehensive discussion of the nature, function, and costs of services for the various electricity supply options.
- ) identify the most important actions required in the short, medium and long term that will successfully develop the electricity sector and expand electricity generation and access in order to support GoSL policy goals.
- Articulate actions to support progress toward short- (next 3 years), mid- (up to 2025) and long-term (up to 2030) goals.

This roadmap was compiled with the support of a wide range of interested parties and stakeholders, including members of industry, civil society, consumer advocacy groups, donors and Government institutions.

In parallel, the Electricity Sector Reform Roadmap team conducted five consultation workshops: one visioning workshop and three consultation workshops focusing on:

- i. policy instruments,
- ii. regulation,
- iii. generation, transmission, distribution and sale,

Three validation workshops were conducted focusing on:

- i. EDSA, EGTC and EWRC
- ii. MOE, MOFED, SPU and PPPU
- iii. All stakeholders

One walk-through workshop was conducted with the donor community.

# 1.3. Roadmap scope

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The value of electricity supply services lies in the various services that the use of electricity provides for all types of electricity users including domestic private services (lighting, cooking, hot water, security, communication, entertainment, etc.), productive activities (agro-processing, mining, transformation industry, manufacturing), public services activities (health, education, administrative service), private commercial activities (banking, trading, consumer products retailing, etc.). It also relies on the cost avoidance (both monetised and unmonetised) to the population and business activity as a result of absence of service or poor quality of service.

The vision driving the Roadmap is that the Sierra Leone electricity sector should create an enabling environment for the provision of electricity supply for increased productivity, wealth creation and improved quality of life of all Sierra Leone's citizens. This Roadmap therefore includes discussion on the organisation of the electricity supply public service in the context of the improvement and expansion of this service. Activities in the electricity sector are termed as generation, transmission, distribution, sale, and end-use.

The focus of the vision presented in this roadmap is centred on the Electricity Act 2011 and Electricity and Water Regulatory Commission Act 2011 (both inspired by the GoSL's 2009 Energy Policy document) completed by the Policy Letter 2016, the Renewable Energy Policy 2015 and the Energy Efficiency Policy 2015.

The actions recommended in this roadmap extend beyond this vision and focus on a more holistic approach to rolling out the Electricity Reform process.

This roadmap responds to requests for deeper analysis on the role that the electricity sector can play in advancing the vision for Sierra Leone in 2035 as reported in the Agenda for Prosperity:

- A modern and well developed infrastructure with reliable energy supplies;
- A private sector led growth creating value added products and providing employment for the people of Sierra Leone;
- An effective environmental management system in place that protects biodiversity and is capable of pre-empting environmental disasters; and
- A model in responsible and efficient natural resources exploitation.

This Roadmap should be considered a work in progress and a starting point for discussions. As datasets and corresponding analysis improve, scenarios and insights will evolve.

Furthermore, as legal, policy, regulation, and market environments shift, additional requirements and areas for analysis and attention will come to light.

# 2. Summary of reform path and key actions

The current situation in electricity supply and use in Sierra Leone is unsustainable – economically, environmentally, socially, and financially the sector. The Government of Sierra Leone (GoSL) recognises the impossibility of electricity supply continuing as it has. The public utilities understand most keenly that the status quo is not sustainable. Currently, there is:

i) insufficient funding to secure fuel supply,

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- ii) insufficient generation capacity to meet the demand,
- iii) neither rule of contract nor regular payment flow between public-owned generator (EGTC) and singlebuyer distributor (EDSA),
- iv) no bankable public utilities (both EGTC and EDSA)
- v) Public utilities do not have clear ownership of their assets and their corporatisation process is incomplete,
- vi) limited regulation of the public utilities that are operating under provisional licences without any social, technical or financial obligation,
- vii) inadequate transmission and distribution grid capacity,
- viii) high technical and non-technical losses and poor collections from post-paying consumers,
- ix) non-cost recovery retail tariff and inadequate tariff structure where the industrial and commercial consumers pay more per unit than the households, and
- x) insufficient funds for capital investment.

Combined, these shortcomings lead to high fiscal burden, inadequate power supply, missed business development and job creation opportunities, low access rate of the population, rationing and poor quality of supply for the population that already have access and frequent recourse to back-up electricity supply at a higher cost.

Practically it will be necessary to implement the reform activities over a period of 13 year with the following broad phasing:

- A **recovery period** in which the sector addresses urgent viability and operationalisation issues through the completion of the implementation of the Electricity Act and the EWRC Act. Most significantly, this recovery period sees the introduction of the Collection Account. This should take up to mid-2018.
- A **transition period** in which the sector prepares for financial stability but still operates under an incomplete commercial framework and without adequate financial flows from contractual agreements. This should take up to 2020. Most significantly, this transition period sees the continuation of the Collection Account. It is desirable that the System Operation (SO)/ dispatching function be moved from EDSA to EGTC. It is anticipated that some independent distribution licensees and/or supply licensees will be operating in the rural areas, and possibly some new large customers (including existing off-grid mining companies) will be authorised to secure stable electricity supply through the grid from new low cost generation capacities.
- A **delivery period** in which mid-term (2021-2025) sector policy objectives are delivered and the sector institutional and organisational structure is set for delivering the long term (2026-2030) objective of universal access to electricity. One of the most critical conditions for effectively delivering on the vision is to focus on raising awareness and building capacity of the institutional players in the electricity sector. Specifically, this should be aimed at innovative policy instruments developed by the GoSL, the regulatory processes developed by the EWRC and the upgraded, enhanced or completely new functions required to operate the various business activities in the electricity sector.

As the stakeholders implement the Action Plan in the months and years ahead, it will work towards three goals that define what it means to be a reformed electricity sector:

# 1. Develop electricity supply public service where the public and the economy need it most:

- A public service delivery model that prioritises need, and the flexible, resilient deployment of resources.
- A rapid, highly effective Priority Response that is focused where an immediate response is necessary for basic functions such as access to water, health, education, communication, secured environment and productive activities, wherever and whenever needed.
- Using modern technology to ensure on the ground commercial and technical staff are fully connected to the consumers from any location, and to improve public access and customer service.
- 2. Embrace partnerships with the private sector to create a sustainable and inclusive electricity supply public service:
  - Recognising that there are many different categories of consumers in Sierra Leone and that the only effective approach is an inclusive one that embraces all consumers but with an adapted response to each customer category.
  - Working in collaboration and partnership with local structures and other public services to understand and address the root causes of lack of (or poor) service, share information, intervene early to poor services, and build locality capacity.
- 3. Focus on the complex needs of Sierra Leone's population and business community at national and local level:
  - A sustainable and affordable service-delivery model based on understanding the needs of Sierra Leone and criteria for bankability of the service-delivery model.
  - Drawing on the diverse and rich perspectives of the people, business community and staff members as invaluable sources of knowledge, experience and insight.
  - o Using strategic information and data analytics to inform resourcing and deployment decisions.
  - Supporting staff members as they deliver change, continuously improve and take pride in being outstanding and innovative public service servants.

# 2.1. Key milestones on the reform path

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- 1. The objective of strategic electricity sector planning, also referred to as Integrated Resource Planning (IRP), is to provide a national, coordinated, long-term, least cost power sector development plan that delivers on policy objectives (security of supply, social goals including universal access to electricity, economic goals including energizing the economic growth, technology and industrial policy goals including renewable energy and energy efficiency). The IRP provides a framework within which more detailed network development plans (NDPs) and off-grid / mini-grid supplies can be planned by operational utilities under the policy directives of Ministry of Energy (MoE) and delivered under the regulation of the Electricity and Water Regulatory Commission (EWRC). Currently, the Government has a good view on the priority and least cost electricity investment projects for Generation and Transmission. There is also a strategic plan (phase I) available for grid rehabilitation, strengthening and extension that should be expanded with a phase II. The planning effort should be focused on planning the off-grid electricity supply public service with the participation of the Local Authorities as appropriate entities responsible for planning the development of local services. The benefit of this planning effort is to maintain a pipeline of mature projects for electricity supply development.
- 2. A carefully defined procurement framework facilitates the conversion of the planned electricity infrastructure into contracted facilities. The procurement framework shall make solicited and unsolicited projects complementary and not disruptive to each other; currently most of the projects are brought in through unsolicited arrangements. Solicited projects through competitive bidding are expected to lead to lower prices and an improved predictability of electricity supply through budget and capacity control.

However, in some cases where auctioning is not appropriate, for example, in small scale projects (up to 3-5 MW in the context of Sierra Leone) these would be eligible for the renewable energy feed-in tariff (FIT) as outlined in a future FIT policy. Bilateral negotiations with preferred bidders are also preferable for large scale project sites (over 50 MW in the context of Sierra Leone). The procurement process for private sector investment will exceed the generation sphere and includes some key functions of EDSA. The benefit of this procurement framework is to reach a compromise between competitive price discovery, transaction cost and delivery time. Furthermore, there is limitation to competitive procurement when a bilateral donor provides equipment on a grant basis that is linked to suppliers of the same nationality as the bilateral donor.

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- 3. In large towns of rural districts (above 20000 inhabitants), where there is insufficient generation capacity and where the existing portfolio of clients is small but with a significant growth potential, isolated grid concessionaires will be contracted to develop the on-grid electricity supply service. This option will include the transfer of the decentralised public assets owned by EGTC and EDSA to this concessionaire until the expiration of the concession. When two cities responding to this criteria are geographically within a small distance (namely, Bo and Kemena, Makeni and Magburaka, Port Loko and Lunsar), the same concession agreement should cover the two cities as well as the subtransmission line interconnecting those two cities and the customers within reach of this subtransmission line. When a city is close to a renewable energy site and to a bulk substation (e.g., Koidu, Bo-Kemena), the concessionaire may use the opportunity to develop the renewable energy site in order to serve the load of the city(ies) with a least cost renewable / thermal generation mix and to export the surplus of electricity generation to bankable off-takers (in country or outside the country through the CLSG interconnector) using the transmission network operated by EGTC. The benefit of this electrification option for large rural towns is the joint development of generation, distribution and supply in a financially sustainable way from the outset. In particular, the expansion of the customer portfolio will guarantee least cost generation finance. Such operation will reduce the cross-subsidy burden of EGTC (development of decentralised thermal generation capacity and fuel cost) and the cross subsidy burden of EDSA (maintaining distant decentralised grid and a small customer portfolio served with poor availability of electricity and lower collection rate than average). Furthermore, it will reduce the operational losses of both utilities and improve the quality of supply of consumers. This is about the transformation of an unsustainable, constrained and poor service business model into a virtuous business model.
- 4. In small towns, cities, and villages of rural districts (under 20000 inhabitants), where there is currently no electricity supply public service and the number of potential customers is limited, an off-grid PPP contractor should be selected to develop a mini grid and organise the public service of electricity supply. The same off-grid contractor would be in charge of taking over the electricity supply service using the public-owned mini-grids that are being developed by UNOPS with the financial support of DFID and the oversight of the Ministry of Energy. The advantage of selecting a single off-grid contractor for a cluster of villages is the relative proximity to the various mini-grid sites for developing the service and the possibility to adopt a uniform electricity supply tariff within the cluster under the control of EWRC. The list of sites of the cluster shall be validated by the EWRC in consultation with the authorities of the locality (that may wish to add specific sites with priority social loads against a fair compensation if the contractor is willing to take them). In some cases, the cluster may coincide with the district boundaries. This option is recommended for the following six rural districts: Kailahun, Pujehun, Bonthe, Moyamba, Kambia and Koinadugu. The benefit of this electrification option is the development of cost effective and sustainable electricity supply service in areas unreached by the grid.
- 5. In urban areas, where there is sufficient generation capacity in a good state of operation and EDSA holds a sizable portfolio of customers (e.g., Freetown and Lungi), EDSA shall retain responsibility for expanding the on-grid electricity services. However, in the situation of financial scarcity aggravated by the implementation of the Collection Account, it will be critical for EDSA to find workable arrangements in order to carry on grid rehabilitation and strengthening and to expand its customer base. If EDSA deems necessary to stay on path of its regulated objectives (number of new connections, efficiency improvement and quality of supply improvement), EDSA may consider options for **outsourcing investment to the private sector** such as: (i) Outsourcing the finance of grid efficiency improvement; (ii) Outsourcing the finance of grid strengthening or extension in view of securing continuity and quality of supply to all and, to start with, to customers willing to finance the infrastructure investment; (iii) Outsourcing the connection of new customers and commercial functions to the existing grid; (iv)

Outsourcing the line extension and connection of willing-to-pay new customers located at a distance from the existing grid. The benefit of this option is a sustainable growth model for EDSA.

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- 6. The market arrangement and procurement process shall lead to timely generation capacity adequacy. There is currently insufficient capacity adequacy in the power system of Sierra Leone. Sierra Leone presently operates « emergency power rental » as the only practical « safety net » mechanism for generation capacity adequacy. The IPP procurement process will ensure that there is sufficient capacity to meet the demand. Regulatory obligations are necessary to ensure that the required capacity comes on line in a timely manner. The benefit of this arrangement is the suppression of expensive emergency power rental that cannot be financed from sector revenue and creates a burden on the state budget.
- 7. The market arrangement shall enable the scale-up of electrification. A split market emerges as the best option: centralised for on-grid supply services and decentralised for off-grid supply services. The Electricity Act (signed in 2011 but effective from 2015) acknowledges electricity supply as a standalone activity and makes it possible to licence public utilities to supply electricity through off-grid systems. Furthermore, it opens the possibility for awarding distribution licences to non-EDSA parties and therefore, to reduce the territorial scope of EDSA. This option could be used for licencing isolated grids or mini-grids. The benefit of this approach is to implement best practices for rural electrification.
- 8. The capability of the market arrangement to capture **renewable energy** at various scales for additional power generation is also a critical issue. The contribution of small scale unit size renewable generators into the fuel mix should not be neglected. The decision on specific renewable energy policy support instruments would follow a **policy update** in order to merge and streamline the Energy Policy 2009, the Policy letter 2016, the Renewable Energy Policy 2015 and the Energy Efficiency Policy 2015. The benefit of this arrangement is a rapid development of low cost renewable energy capacity with private investment.
- 9. The market arrangement will unlock the benefits of the regional electricity market that includes higher levels of energy security and avoidance or deferral of the construction of new power plants (and reduction of the reserve capacity requirement). A **Transmission System Operator (TSO)** should manage the interconnector as another part of system operation and an interchange agreement would be reached with the system operators on the other end of the interconnector. The Transmission System Operator will ensure that the technical criteria for interoperability with the regional grid are respected. It needs to be independent from the state-owned generators to ensure equality of treatment of all generators. Benefits include increased levels of energy security, deferral or avoidance of new power plants by sharing power, reduction of electricity reserve requirements and increased access to finance for projects developed by smaller, less creditworthy utilities. The TSO will be created when need arises and shall be an affiliate of EGTC holding.
- 10. Attracting private investment is challenging given an unbundled market structure where the retail price is controlled by the Government. A **Collections Account** operated by an independent agent needs to be created including a cash waterfall arrangement that provides a payment guarantee for the prioritised payments backed by a Sector Wide Budget. The highest priority is given to Government tax and levy in order to contribute to the public budget. The second priority is given to the payment of operation and maintenance expenses of all activities through the value chain, in order to maintain the integrity of the electricity supply service. The third priority is given to the payment of investment charge of private investors (also pari passu of PPP projects). The fourth and last priority is given to the payment of a public investment charge not covered by a guarantee instrument (other than sovereign guarantee). With such an arrangement, the Government bears the full responsibility of insufficient revenue due to price set below cost recovery level. The GoSL will therefore manage the trade-off between subsidy injection in the sector and electricity prices. As a result, it is expected that a policy for phasing out the sector deficit will be set in place, through progressive tariff increase, reduction of the cost of the generation mix, increase of the transmission capacity and improved efficiency of distribution and sales. Part of the bankability of private investment is the establishment of a sector-wide Collection Account (that exceeds the current scope of EDSA collections account) as per the policy Letter of GoSL to The World Bank of June 2016. The scope of the "Sector Wide Budget" will be restricted to the fraction of the market that includes EDSA and EGTC and where the tariff is controlled by the Government. The other fraction of the market that is not connected to EDSA and EGTC and where the retail tariff is approved by EWRC

independently and under the principle of cost recovery may be excluded from the Sector Wide Budget. The advantage of this arrangement is that the GOSL takes full responsibility for the financial imbalance of the electricity sector (with budget support of Donors, if any) and mitigates the risk for private sector finance.

- 11. Considering that the current and short-term deficit of the electricity sector is mostly structural (and only partly operational), the **financial sustainability in the electricity sector** will be achieved once sufficient low cost generation is commissioned (Bumbuna II) or secured (through the Transco CLSG interconnector) and there is sufficient transmission capacity between Bumbuna II and Freetown (commissioning of the 225kV Bumbuna to Waterloo transmission line). Part of financial sustainability is the introduction of an Automatic Tariff Adjustment Formula (ATAF) as per the Policy Letter of GoSL to the World Bank of June 2016. Also, part of financial sustainability is the improvement of the **operational and commercial efficiency** of EDSA through the appointment of a management contractor, which is effective since November 2016. The benefit of this operational and structural evolution is the eradication of government subsidies.
- 12. **Tariff restructuring** is an ultimate but delicate goal of the reform process. It will bring more distributional equity in the sector by ensuring that costs and benefits of change are distributed in a fair manner across all customer segments and that affordability is safeguarded. **Fuel tax exemption for thermal generation** is one short term lever for reducing cross-subsidies between customer segments and contributing to the affordability of tariff, at least as long as the share of thermal plants is high in the generation mix. The benefit of tariff restructuring is the eradication of cross-subsidies between customer categories and the preparation for the transition to a competitive decentralised market.

# 2.2. Key actions (priority 0: to be completed by mid-2018)

# **J** Set-up of the EDSA collection account

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This action will require the following decisions:

- An amendment of the Electricity Act by Parliament. The amendment would (i) enable the establishment of the sector wide Collections Account, (ii) allow, in certain conditions, the transfer of isolated generators of EGTC and isolated distribution grids of EDSA to local councils, (iii) allow inflation adjustment of fines specified in the Electricity Act, and (iv) allow eligible customers in restrictive conditions in order to avoid negative impact on EDSA revenue.
- The development of a sector wide budget under the leadership of the Public-Private Partnership Unit (PPPU) to be approved by EWRC.
- The development of an operation manual of the Collection Account (under the leadership of PPPU); establishment of the Collection Account Committee (driven by PPPU); and establishment of an accredited list of suppliers and accreditation process (managed by the Collection Account Committee).
- A cabinet decision on the **financial regulation of the electricity sector** (including in appendix the operation manual of the collections account).
- Considering the need to set-up a transmission tariff, it will be necessary to perform an accounting unbundling of EGTC for its generation and transmission business activities. Therefore, EWRC may issue an obligation for EGTC to unbundle its generation and transmission accounts and setup a transmission tariff.
- A number of decisions of the Ministry of Energy (MoE) including (i) designation of the Collection Bank (following a procurement process supervised by the PPPU), (ii) designation of the Independent Agent (following a procurement process supervised by the PPPU).

# **Develop a procurement framework**

The MoE will issue a procurement framework guideline that maps the unsolicited and solicited process. Most likely, the unsolicited procurement process would cover the small scale IPPs (less than 3-5 MW) with a feed-in tariff policy, and the large scale IPPs (more than 50 MW) with a

preferred bidder approach. Between 3-5 MW and 50 MW a solicited consultation process is the preferred approach but also does not exclude unsolicited projects. The procurement framework will exceed the generation sphere and include investment functions of EDSA.

# **)** Develop off grid Licences.

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This action will require the following decisions:

- An off-grid regulation to be developed by EWRC; this regulation will cover individual off-grid electricity supply services and isolated mini grid electricity supply services and will include off-grid Licence templates.
- EWRC will also be required to develop a specific connected mini-grid regulation including a connected mini grid Licence that would be an option for succession of an isolated mini grid Licence, should the main grid be extended to the territory of the isolated mini grid. Another option would be the absorption of the mini grid infrastructure by the distribution Licensee and indemnification of the off-grid Licensee. As a result, both isolated mini grid regulation and connected mini-grid regulation will form the mini grid regulation of Sierra Leone.
- At some point in the future (proposed for 2019), the MoE could specify the conditions for **devolving** its powers for organising off-grid electricity supply services to local councils, in the spirit of the Local Government Act of 2004.
- In order to facilitate the electrification of district capital cities, the MoE could envisage that the distributed assets owned by EGTC (remaining isolated generators and associated lands) and EDSA (remaining isolated distribution grids), in some cities, be handed over to local authorities for them to organise the local electricity distribution service possibly through a PPP agreement. The transfer of distributed assets from EGTC and EDSA would be effective after the signing of the contract of the PPP contractor. This option would require an amendment to the Electricity Act.

# **Roadmap Scorecard**

The MoE will formulate and submit to the Steering Committee a roadmap scorecard that includes a common list of indicators responding to the principle "if you can measure it, you can change it". The scorecard will describe the roadmap's objectives in operationally measurable terms. The indicators will be specific in terms of quantity, quality, time, target group and place. The performance standard to be reached in order to achieve the goal, the purpose and the outputs shall be specified, as well as the method of verification.

# **Energy Policy Update**

The MoE will issue an energy policy update that will reconcile and simplify (based on their alignment and relevance with the roadmap) the various reference policy documents for the energy sector (Energy Policy 2009, Policy Letter 2016, Renewable Energy Policy 2015 and Energy Efficiency Policy 2015). The Renewable Energy Section of the Energy Policy Update will call for the development of a Feed-in-Tariff Policy as a policy instrument to support the development of renewable energy.

# **)** Statutory instruments of the Ministry of Energy related to Electricity theft and collection of fines

- The MoE will decide on a specific policy aiming at strengthening actions on **electricity theft**
- Decision defining the procedures for collecting fines resulting from an offence to the provisions of the Electricity Act and those arising from false declarations. Fines specified in the Electricity Act should be adjusted for inflation (this would require an amendment of the Electricity Act).
- Decision providing for an account for receipt of fines and laying down the procedures for the management of fees and fines resulting from the violation of the provisions of the Electricity Act and false declarations related to regulated activities in the electricity sector.

# Statutory instruments of the Ministry of Energy related to the Electricity Act

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- Decision on the completion of the unbundling of the National Power Authority (NPA) assets to EGTC and EDSA and the dissolution of NPA. This will follow to the transfer of "title deeds" of transferred assets to the new owning entity. For NPA assets that have not been transferred yet or are in dispute, this will require a technical and financial audit to be commissioned by the MoE under the supervision of the Steering Committee. It is understood that the Energy Asset Unit established by the Electricity Act is no longer operational and its functions have been taken over by the Steering Committee. It is the responsibility of each corporate board to ensure that the corporatisation process is complete.
- Decision on the fees to be prescribed under the Electricity Act art. 81 (2) (i): this decision concerns the fees to be paid to EGTC and the fees for test and certificates of required qualifications under the Electricity Act. The former excludes the tariff of bulk electricity supply that should be part of a power purchase agreement (PPA) between EDSA and EGTC but covers the system services to be paid by off-takers and IPPs (excluding small scale renewable generators eligible for the expected Feed-In-Tariff). The latter follows a specification of qualifications required under the Electricity Act in coordination with ECOWAS specialised institutions for the energy sector (priority 1).

# **J** Statutory instruments of the Regulatory Commission related to the EWRC Act

- A decision setting out the technical criteria and required standards of performance for Licences for generation, transmission, dispatch, import, export, distribution, [*captive load supply (if necessary)*,] on-grid sale of electricity, off-grid sale of electricity and the provision of related services. These criteria specify the terms and conditions of the Licence agreement and are reported in a technical and regulatory annex. At minimum, this annex will cover the scope of the Licence, the property covered by the Licence, the performance indicators associated to the activity, the right and obligation of the Licensee, the royalty/fees and resource of the Licensee, and specific regulatory requirements. These technical criteria will form the basis for an interim grid code.
- Regulatory decision setting the procedures for **determining and revising tariffs** for the sale and purchase of electricity, for grid connection and for the transit of energy.
- Decision on complementary regulatory regimes to Licence below a **minimum capacity threshold**: authorisation, declaration and freedom.

# 2.3. Key actions (priority 1: to be completed by mid-2019)

# **)** Generation capacity adequacy regulatory instruments

EWRC will develop regulatory instruments in order to encourage a timely capacity adequacy. The issue is to make an obligation to any Distribution Licensee to procure or contract an amount of generation capacity that exceeds its peak customer demand by an agreed margin as determined by EWRC. This margin will depend on the availability of the generation portfolio connected to the grid (or mini-grid). An option is to include in the generator Licence (and therefore in the specification of new IPPs) an obligation to maintain a minimum amount of firm power capacity in order to control the level of generation intermittency, or seasonality or availability at a given date (e.g., targeted Commercial Operation Date). The investment in large scale solar PV power plants shall include the obligation to install automatic load following equipment in existing or new thermal generation plants.

# Renewable energy support instruments

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The MoE will detail a feed-in tariff policy that will specify maximum feed-in tariff for specific technologies (hydro, solar PV, solar thermal, wind, biogas, biomass, marine) and different capacity ranges between 500 kW (minimum capacity) and 3-5 MW (maximum capacity yet to be decided) and the connection modality (on grid / off grid). In any case, the price should never be above the long term marginal generation cost of the grid as proposed by EWRC (using the IRP) and decided by the MoE (for example:12 US cents / kWh for grid connected projects). A premium may be granted for firm capacity supply (possibly on specific time bands) against a penalty for defaulting. There will be a cap on the maximum intermittent capacity that may be connected to the grid in order to comply with the capacity limit of the national grid for absorbing intermittent generation (linked to the thermal generation capacity under automatic control of the frequency of the network). Prices will be determined in hard currency (e.g., USD, GBP, EUR, or others) for average conditions of local resource (possibly per zone). The price shall be fixed for a period exceeding the debt maturity of projects (12 to 15 years maximum). The risk of payment default by an off-taker shall be mitigated by a guarantee instrument (excluding sovereign guarantee). Technical default of off-taker preventing the grid to off-take the electricity generated by a renewable energy facility shall be mitigated by a deemed energy compensation formula (i.e., similar to a take-or-pay obligation). In order to reduce the transaction cost and fast track delivery, the power purchase agreement for eligible projects shall be standardized and non-negotiable (and therefore bankable).

# **)** Tariff Levy for regulation and rural electrification

- A levy to finance the Rural Electrification Fund may be considered at a later date (post 2018).

# **J** Statutory instruments of the Ministry of Energy related to the Electricity Act

- Decision on voltage threshold between transmission and distribution grid art. 11 (2) (a). This
  decision will determine the future ownership of new lines with a voltage between 30 kV (maximum
  current voltage operated by EDSA but with technical design up to 66 kV) up to 161 kV (minimum
  current voltage of the transmission grid allocated to EGTC).
- Decision on the manner in which electricity shall be measured and the standards of measurement which shall be employed and the manner in which electricity is permitted to be, or is prohibited from being used – art. 81 (2) (b).
- Decision on qualifications to be possessed by persons, before they may be entrusted with the construction, erection, repair or alteration of any installation or apparatus or with the charge of any installation or the control of the operation of apparatus art. 81 (2) (d).
- Decision on the nature of the tests to be employed for ascertaining whether persons possess the qualifications prescribed, the form and period of validity of certificates to be issued to persons

found to possess the said qualifications and the **fees** to be paid for such test and certificates – art. 81 (2) (e).

- Decision on measures to be taken and the fittings to be supplied and used in connection with installation in order to secure public and private **safety** art. 81 (2) (f).
- Decision on the manner of holding an **enquiry** under the Electricity Act art. 81 (2) (g).
- Decision on form of notices and the manner of service art. 81 (2) (h).
- Decision determining and publishing **norms and standards** for the electricity sector accepted in Sierra Leone.

### **J** Statutory instruments of the Regulatory Commission related to the EWRC Act

- Regulatory decision concerning the rules and procedures for fixing **electricity tariff** to the final consumer, tariff for accessing the transmission and distribution grid, and tariff for generators.
- Regulatory decision on the procedures for determining and implementing the tariff schedule for the remuneration of operators in charge of the operation of state-owned facilities (pricing model for state owned facilities).
- EWRC will initiate the consultation process for establishing a grid code and off grid code for the electricity sector.

# 2.4. Key actions (priority 2: to be completed by mid-2020)

# **)** Transmission System Operator

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- The MoE will specify the functions of a Transmission System Operator (TSO). These functions, operationalised by EGTC, emphasise (i) the security of supply through adequate system reliability including priority for mutual back-up through interconnector, (ii) the management of energy flows on the system as per contracts requirement including unscheduled flows and transits, (iii) the control of the voltage plan, (iv) the dispatch of generating installations and the use of the interconnector, (v) the non-discrimination between users (generators, distributors, and, later, eligible customers) but priority of access for renewable energy generators if required by the policy, (vi) the information exchange with the sub-regional system balancing manager based in Guinea and the WAPP Coordination and Information Centre (CIC) based in Cotonou, (vii) the establishment of dispatch rules in compliance with the grid code.
- EWRC will establish a roadmap for integration of the Sierra Leonean Electricity System with the Regional Electricity Market of West Africa and progressive establishment of trading functions (including establishment of a market operator - MO); it will also validate the dispatching rules established by the Transmission System Operator.

# **J** Energy Efficiency Incentives

- The MoE will promote specific energy efficiency policy instruments in order to deliver on the policy objectives which bear mostly on;
  - i. the phasing out of incandescent lighting bulbs,
  - ii. the promotion of energy efficient street lighting,
  - iii. the reduction of grid losses,
  - iv. the development of energy efficiency standards and labelling programmes,
  - v. the promotion of energy efficiency in buildings and industries.

### J Statutory instruments of the Ministry of Energy

Decision on the creation of a Rural and Peri-Urban Electrification Authority spun off from EDSA. For clarity, this authority could be called "Modern Energy Access Authority". The proposed objectives of the Authority would be to (i) collect and make available information on potential renewable energy sites at local level; (ii) develop the national electrification plan to be integrated into the national electricity sector plan; (iii) establish the multi-annual programme for the implementation of this plan; (iv) promote electrification through technical and financial support for public or private initiatives; (v) establish tender documents, lead the tendering process for engaging contractors for supplying

equipment and works required for this purpose; (vi) support the development of electrification projects through the stimulation of initiative at local level, mobilize funds and provide various services; (vii) manage finance, promote and monitor the implementation of electrification projects; and (viii) raise funds and monitor donor relations and follow-up funding requests in collaboration with the relevant departments of the Ministries in charge of electricity and finance.

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Decision on the creation of a Rural Electrification Fund for co-financing priority projects (Electricity Access, Renewable Energy, and Energy Efficiency). For clarity, this fund could be called the Energy Management Fund. This decision shall specify the source of the ordinary and exceptional resources allocated to the Fund and their conditions of use. It will specify the procedures for awarding grants and loans via the Fund and the partnership agreements between the Fund and the commercial banks that would channel finance to their customers using their corporate credit assessment policy and providing a private finance leverage on donor and public funds. It lays down the principles of eligibility, evaluation and selection of projects and specifies the methods of administration and management of the Fund.

The draft short term Roadmap for Reform of the Electricity Sector is illustrated in the tile diagram on the next page.



Draft short term roadmap for reform of the electricity sector

Figure 1 - Draft short term roadmap for reform of the electricity sector

Source: ASI

# 2.5. Key actions (priority 3: Mid-term, i.e. 2020-2025)

# 1. Tariff restructuring

Considering that the current and short-term deficit of the electricity sector is mostly structural and partly operational, the financial sustainability in the electricity sector will be achieved once sufficient low cost generation is commissioned (Bumbuna II) or secured (through the Transco CLSG interconnector) and there is sufficient transmission capacity between Bumbuna II and Freetown (commissioning of the 225kV Bumbuna to Waterloo transmission line). It is even expected that tariffs could be reduced compared to the current level. The sector revenue would still increase as a result of the growth of the load served by the grid (economic growth and access to electricity). The price reduction should create an opportunity for (i) tariff restructuring, i.e. reversing the current growing tariff function (i.e. higher tariffs for large consumers) to a decreasing one and (ii) enabling market opening to existing large customers (Eligible Customers). In certain conditions, Eligible Customers may be authorised prior to tariff restructuring. This will relate specifically to either a new large customer or the expanded load of an existing customer (separate from the existing load) that would contract part of the capacity of a new power plant.

# 2. Amendments of the Electricity Act

**2nd Amendment**: Transform EGTC in a holding company with two subsidiaries (EGC and ETC); Enable Eligible Customers to set-up bilateral contracts as exceptions to the single buyer market model

# 3. Statutory instruments of EWRC

- Decision on a final Grid code that will ultimately replace the interim Grid Code. The grid code will cover Primary Grid Code (including Governance Code, Capacity Development and Planning Code, Information Exchange Code, System Operation Code, Schedule and Dispatch Code, Outage Planning Code, Protection Code and Metering Code) and secondary grid code (e.g., quality of services code).
- Decision on the 1st revision of wheeling tariff that will follow the legal unbundling of ETC and the enabling of Eligible Customers.
- Decision on the 1st retail tariff reduction that will follow the commissioning of the 225 kV Bumbuna to Waterloo transmission line.
- Decision on the 2nd revision of wheeling tariff that will follow the commissioning of Bumbuna II.
- Decision on the 2nd retail tariff reduction that will follow the commissioning of Bumbuna II.
- 3rd Amendment: Sale of minority share of EDSA and EGTC.

# 2.6. Key actions (priority 3: Long-term i.e. after 2025)

# 4. New Electricity Act

Transform the single buyer model into a **decentralised market model**. The decentralised market model (or bilateral trading) is the ultimate successor to the current single buyer market, once the basic requirements for competition in the market are met. In a decentralised or "net pool" trading arrangement, most typically over 90 percent of the trade is conducted under bilateral arrangements, under which generators sell directly to power retailers (including distribution companies) that sell power to end users, power marketers (traders that deal with other traders and retailers), and large end users of electricity. Bilateral trading implies third party access (TPA) to the network backed with regulatory support in the form of reasonable wheeling and backup charges.

The draft long term Roadmap for Reform of the Electricity Sector is illustrated in the tile diagram on the next page.

### Draft long term roadmap for reform of the electricity sector



Figure 2 - Draft long term roadmap for reform of the electricity sector Source: ASI

# 2.7. Sustainable business model for EDSA

The sustainable business model for EDSA is to provide electricity supply throughout the country especially in large towns where there is already sufficient generation capacity and a large customer base. EDSA may subcontract services to the private sector to serve other parts of the country when necessary. EDSA takes ownership of the facility at the expiration of the distribution licences or concession agreement.

The process of corporatisation of EDSA is still in progress therefore, the assets it operates are not completely transferred to and owned by EDSA. EDSA signs PPAs with IPPs at non affordable tariffs. The revenue generated from these IPPs is not sufficient to pay those suppliers. Furthermore, EDSA is challenged to sign a PPA with EGTC at a price above its payment capacity. The Authority has difficulties to reach all towns of the national territory to discharge its mission of electricity supply. The purpose of the recovery and transition period is to transform EDSA into a viable and bankable company that operates and develops the national electric distribution and supply infrastructure on a least cost basis (in coordination with MOE), and that maximises the leverage of public funding with private finance (in coordination with MOFED).

EDSA should be protected from any regulatory decision that would prevent its financial recovery such as: (i) any increase in cost-of-doing-business without the opportunity to pass it through the tariff, or (ii) loss of the high margin customer segment (e.g. through an Eligible Customer policy).

EDSA will retain capacity to rehabilitate, strengthen and expand its asset base and grow its customer base. In order to reach the electricity access policy objectives of the urban population (where EDSA is mostly present), it will be necessary to connect on average around 40,000 new households per year.

Access to finance is a critical issue for EDSA. As a Public Authority, EDSA should receive the financial support of the State, its unique shareholder. However, the financial capability of the State is constrained by the IMF prudential rules. The alternative option is to outsource some of EDSA's functions to the private sector, which does not mean privatisation. Outsourcing to the private sector is a contractual way for EDSA to achieve MoE policy goals of increased number of connections and improved quality of supply in the absence of access to sufficient equity capital or constrained MoFED resources. It is also a way for building up EDSA's capacity so that it can function as a viable and independent commercial entity.

Part of the change in corporate culture is that any activity with a quantifiable financial benefit shall be financed by (affordable) loan and not by subsidy or grant; grant or equity injection shall be considered only when there is no direct quantifiable benefit that results from the targeted activity agreed with the Collection Account Committee (and later by the board); equity injection should also be considered to balance the financing mix with loans from banking institutions, and therefore raise the borrowing capacity.

The action plan for EDSA follows:

# 1. During the recovery period (up to mid-2018):

- 1.1 Implementation of Collection Account
  - Immediately strengthen the Interim Collection Account (under control of MOFED).
  - An Independent Agent will manage the Collection Account and waterfall payment priority (implementation of the fully-fledged collection account).
- 1.2 Negotiate connection fee increase up to deep charge cost recovery level
- 1.3 Complete the transfer of assets from NPA including "title deeds" and the corporatisation process
- 1.4 Write off pre-unbundling debt on fully amortised or retired assets
- 1.5 Write off pre-unbundling payment arrears
- 1.6 Receive payment of outstanding bills from customers since the unbundling
- 1.7 Receive short term loans from MOFED for payment of bills to IPPs

- 1.8 Tighten Management contractor target:
  - Reduce commercial loss
  - Enforce anti-theft policy including penalty payment
  - Improve collection efficiency
  - Fast track staff assessment and conduct staff right sizing
  - Develop improved workforce training programmes
  - Develop a meter installation and inspection programme
  - Strengthen operations and fault repair
  - Develop technical loss reduction investment programme
- 1.9 Adjust connection fees to deep charge cost recovery level

# 2. During the transition period (up to 2020)

- 2.1 Obtain a distribution and sale Licence from EWRC
- 2.2 Franchise and concession for grid extension and isolated grid development under Twinning Manpower Development Framework
- 2.3 Submit first annual report in 2019 (on FY 2018) as per Electricity Act obligation

# 3. During the delivery period (after 2020)

- 3.1 Tariff restructuring will transform the household customers into a high margin segment and the large customers into a low margin segment
- 3.2 Preparation for bilateral market arrangement
  - Ability to sustain the exit of lower margin customers that would prefer to trade directly with generators or importers
  - Merging with isolated distribution licensees

### Draft Roadmap for EDSA



Figure 3 - Draft roadmap for EDSA Source: ASI

# 2.8. Sustainable business model for EGTC

The sustainable business model for EGTC is to own, maintain, operate and develop critical publicly owned (or controlled) assets in the generation (national scale) and transmission of electricity. The large scale hydropower generation installed capacity shall increase from 50 MW in 2015 to over 800 MW in 2030. The transmission grid shall expand from 200 km in 2015 to over 1200 km of 225 kV (& 161 kV) lines and 800 km of 66 kV lines in 2030. All these assets shall be owned and operated by EGTC, or eventually shall return to public ownership at the expiration of the concession agreements (and therefore be transferred to the balance sheet of EGTC). Local scale generation capacities may fall in the ownership of local Authorities. EGTC will also provide reserve capacity and ancillary services to the system against payment by users of the transmission grid.

Although EGTC has been established as a Utility Company, by Act of Parliament, currently, the transfer of assets to EGTC has not been completed, and EGTC in consequence, does not own the assets that it operates. Furthermore, EGTC has not been able to obtain a sustainable power purchase agreement from the single buyer EDSA (there is a fundamental problem for EDSA signing a PPA at cost recovery tariff for EGTC that would not be affordable to EDSA), has a large number of staff deployed throughout the country with skills challenges, and has not submitted yet any annual report. Under the current financial situation of EDSA, EGTC is constantly unable to meet its financial obligations, and has to depend on public subsidies in the form of bailouts by MOFED. As a result, it is recommended to place EGTC under the Collection Account Arrangement until those issues are resolved. Thereafter, EGTC should operate at par with any other IPP through a PPA with EDSA. In the immediate interim, and until the Collection Account is operational, EDSA should honour the terms of the interim PPA signed between EDSA and EGTC. The purpose of the recovery and transition period is to transform EGTC into a viable and bankable company that operates and develops the national electric generation and transmission infrastructure on a least cost basis (in coordination with MOFED).

Part of the change in corporate culture is that any activity with a quantifiable financial benefit shall be financed by (affordable) loan and not by subsidy or grant. Grant or equity injection shall be the decision of the Board.

Equity injection by the unique shareholder of EGTC (State) should also be considered to balance the financing mix with loans from banking institutions, and therefore raise the borrowing capacity.

Within EGTC, the senior executive team is the Director General, the new Directorate of Planning – to be set up, the Director for Human Resources, the Director for Finance, the Director of legal affairs, the Director of technical operations and the Commercial Director. The next layer is the senior management team comprised of Heads of services. The leadership of EGTC has an essential role to embrace, demonstrate, and champion change. As the Electricity Supply Public Service moves forward, it should set clear expectations and provide the training, tools, and other resources necessary for all leaders to be effective in this role.

# The action plan for EGTC follows:

# 1. During the recovery period (up to mid-2018):

- 1.1 Receive payment of outstanding debts from EDSA
- 1.2 In the immediate short-term continue to operate the interim PPA signed with EDSA
- 1.3 When the interim collection Account becomes operational, be treated at par with any other IPP under the arrangements of the Account or any other source of payment
- 1.4 Receive payment from the Independent Agent for O&M charges (during its time under the collection account arrangement, EGTC will receive payment from its authorised costs and no longer from invoicing EDSA)
- 1.5 Outsource Fuel Supply Management for thermal plants
- 1.6 Complete the transfer of asset property including "title deeds" and the corporatisation process
- 1.7 Write off pre-unbundling debt on fully amortised or retired assets

1.8 Write off pre-unbundling payment arrears

1.9 Contract Twinning O&M Expertise for EGTC generation portfolio

1.10 Receive short term loan from MOFED to pay for the fees of twinning O&M expertise

1.11 Receive short term loan from MOFED for payment of bills to fuel suppliers

- 1.12 Receive medium term loan from MOFED for financing technical loss reduction programme (transmission loss, fuel loss, lubricant loss and any other consumable, rehabilitation of Goma HPP)
- 1.13 Receive medium term loan from MOFED to procure long lead time spare parts and rehabilitate workshops
- 1.14 Contract Technical Assistance programme for change management and reengineering of EGTC functions and processes
  - Fast track staff assessment and conduct staff right sizing following assets restructuring
     Develop staff training programme targeting critical assets

1.15 Procure 10 MW back-up thermal power capacity in replacement of emergency power (additional tranches of 10 MW over the next two years)

### 2. During the transition period (up to 2020)

- 2.1 Obtain a generation and transmission Licence from EWRC
- 2.2 Receive finance from MOFED to improve system management and automatic frequency control of thermal power plant in order to absorb the load of solar PV plants (to be financed by both IPPs and MOFED)
- 2.3 Receive long term finance from MOFED to rehabilitate, strengthen and expand the transmission grid
- 2.4 Perform an assets restructuring (in view to improve the ratio of Return-On-Asset (ROA) of EGTC) and financial analysis (in view to mobilise financing on decentralised assets) with the option of divesting some of the isolated generators to local councils to let them organise off-grid local electricity supply services.
- 2.5 Submit first annual report in 2019 (on FY 2018) as per Electricity Act obligation to MOE for tabling at Parliament
- 2.6 Procure 20 MW back-up thermal power capacity in replacement of the emergency contract (in addition to the 10 MW during the recovery period)

### 3. During the delivery period (after 2020)

- 3.1 Sign a PPA with EDSA to comply with Electricity Act prior to exiting the collection account arrangement
- 3.2 Exit the collection account arrangement once EGTC becomes a viable and bankable company
- 3.3 Minority privatisation option of EGTC in order to leverage private finance for business growth
- 3.4 Preparation for bilateral market arrangement
- 3.5 Develop and operationalise the functions of transmission system operator
- 3.6 Legal unbundling of generation and transmission activities (ISO) of the market requires it
- 3.7 Develop new mid-scale generation capacities in partnership with private investors
- 3.8 Develop trading activities to sell to eligible customers and export
- 3.9 Own and operate the generation facilities and transmission facilities that return to public ownership at the expiration of the Licence or concession contract

### Draft Roadmap for EGTC



Figure 4 - Draft roadmap for EGTC Source: ASI

# 2.9. Sustainable institutional model for EWRC

The sustainable institutional model for EWRC is based on its capacity to fulfil its functions and exercise its powers as specified in the EWRC Act, 2011 and the National Electricity Act, 2011 (and GVWC Act and the SALWACO Act also). The EWRC has only issued provisional licences as it is in the process of developing terms and conditions for a permanent licencing regime. Also, the Commission has issued provisional tariffs for both on-grid and off-grid utilities (EDSA, EGTC, PRESSD Project), while it is engaged in the process of developing a more detailed tariff determination guidelines and methodology for the sector players.

Currently, the capacity at the EWRC to fulfil its regulatory functions in the areas of market, economics, technical and arbitrage is not yet at the desired level but measures are being put in place to improve its human, logistical and administrative capabilities.

The EWRC has not yet submitted an annual report but a draft has been prepared pending the finalization of the audited financial statements for 2016. The final version will be submitted to the Minister of Energy who would in turn lay of copy of it before Parliament (EWRC Act, art 28).

Although the EWRC Act, in its article 19, declares the Regulatory Commission independent of any person or authority in the performance of its functions, the EWRC is not in a position to build this independence because its staff are still on the payroll of GoSL and the commercial framework of the sector is so dysfunctional that it cannot ensure a stable revenue to support reasonable regulatory charges. Furthermore, in the current situation of the sector, the claim of independence of the EWRC would inevitably create institutional conflicts between the policy and legislative sphere (with regard to use of state resources and policy principles related to poverty reduction) and the regulatory sphere (with regard to setting tariff at cost recovery level), which has not been considered by the legislator.

Currently EWRC does not have sufficient income collected from the licence fees to ramp-up its role and functions. As a result, it is recommended that EWRC's levies be given first priority in the waterfall payment arrangement of the Collection Account. EWRC indicated that the revenue of the licence fees and annual levy set at one percent (maximum authorised by the SLEWRC Act, art. 25(1)(e)) of the gross operating revenue of the licensees should be sufficient to finance its operation and development programmes. Assuming full compliance of all the regulated entities (in terms of payment of levies and licence fees), the EWRC should be on the road to financial stability by 2021. EWRC maintained that some of the proceeds from the levies would be used to fund programmes within the energy sector as prescribed in the EWRC Act art 25(2).

The principles of independent economic regulation will apply when the basic commercial structure becomes viable (after the commissioning of Bumbuna phase II). In the mean-time, the operating manual of the Collection Account will document the hierarchy of decisions between GOSL/MOE and EWRC.

The action plan for EWRC follows:

# 1. During the recovery period (up to mid-2018):

- 1.1 EWRC prepares an operational and development plan and budget forecast
- 1.2 Invoice EDSA and EGTC for licence fees and levies
- 1.3 Receive payment from the Independent Agent for levies
- 1.4 Staff recruitment and capacity building
- 1.5 Capacity building on urgent regulatory functions
- 1.6 Continue with the development of off-grid regulation / mini-grid regulation
- 1.7 Continue with the development of technical criteria for Licences for generation, transmission, distribution, captive load supply and the provision of related services
- 1.8 EWRC to fast track an interim grid code and set-up a consultative process for establishing the grid code of Sierra Leone

- 1.9 Continue with the development of Guidelines, Rules and Principles for tariff setting
- 1.10 Procedures for determining and revising tariffs for the sale and purchase of electricity, for grid access and for the transit of electricity
- 1.11 Submit first annual report in 2017 (on 2016 FY) as per SLEWRC Act obligation

# 2. During the transition period (up to 2020)

- 2.1 Conduct grid code consultative process
- 2.2 Preparation of a roadmap for integration of the Sierra Leonean Electricity System with the Regional Electricity Market of West Africa
- 2.3 Complementary regulatory regimes to Licence below a minimum capacity threshold: authorisation, declaration and freedom
- 2.4 Regulatory decision on the procedures for determining and implementing the tariff schedule for the remuneration of operators in charge of the operation of state-owned facilities (pricing model for state owned facilities)
- 2.5 Continue with the development of technical criteria for Licences for dispatch, import, export, captive load supply, on grid sale of electricity, off grid sale of electricity and the provision of related services

# 3. During the delivery period (after 2020)

- 3.1 Generation capacity adequacy regulation (grid code)
- 3.2 Regulatory decision concerning the rules and procedures for fixing electricity tariff to the final consumer, tariff for accessing the transmission and distribution grid, and tariff for generators
- 3.3 Eliminate price distortions and increase electricity tariff price transparency, including time-ofuse pricing and pay-for-services models
- 3.4 Assemble and publish a grid code
- 3.5 Decision on the 1st revision of wheeling tariff that will follow the legal unbundling of EGTC and enabling of Eligible Customers
- 3.6 Decision on the 1st retail tariff reduction that will follow the commissioning of the 225kV Bumbuna to Waterloo transmission line
- 3.7 Decision on the 2nd revision of wheeling tariff that will follow the commissioning of the 225kV Bumbuna to Waterloo transmission line
- 3.8 Decision on the 2nd retail tariff reduction that will follow the commissioning of Bumbuna II

# 2.10. Role of the Ministry of Energy

The Ministry of Energy has the mandate to oversee, plan and coordinate the implementation of the Roadmap. The Ministry of Energy has a key ongoing role within the electricity sector to be the central driver of reform and to ensure that decisions and decision-making processes are aligned to and advance the Roadmap.

The MoE has two teams of full-time implementation leaders, including individuals who have been members of (or supported) the Presidential Delivery Team over the past year:

- ) Implementation Planning: Focused on planning and overseeing development and implementation of the Roadmap
- ) Organisational Change Management: Focused on the people side of the change process culture change, leadership, communications, internal and external engagement processes

The MoE shall also recruit an external project management leader with strong experience in business transformation and re-engineering, as well as an expert in communications. The teams shall develop a subaction plan into specific work streams and establish a standard project lifecycle to better structure implementation. Although the MoE is a centralised institution, not all of the work will be done centrally. Consistent with the culture change plan, teams that will be accountable for various aspects of implementation are being set-up across the sector. The MoE will coordinate and monitor the work of these teams.

The action plan for MoE follows:

# 1. During the recovery period (up to mid-2018):

- 1.1 Oversight of the emergency recovery plan for the electricity sector
- 1.2 Capacity strengthening programme in the planning, engineering and monitoring unit
- 1.3 Establish organisational change management team and programme at MoE, focused on the people side of the change process culture change, leadership, communications, internal and external engagement processes
- 1.4 Recruit an external project management leader with strong experience in business transformation and re-engineering, as well as an expert in communications
- 1.5 Decision on the completion of the unbundling of NPA assets to EGTC and EDSA and dissolution of NPA.
- 1.6 Policy on financial regulation of the electricity sector
- 1.7 Design the Collection Bank (jointly with MOFED)
- 1.8 Design the Independent Agent managing the Collection Account (jointly with MOFED)
- 1.9 Procurement framework guidelines
- 1.10 Formulate a roadmap scorecard
- 1.11 Energy policy update
- 1.12 Policy on strengthened actions on Electricity theft
- 1.13 Procedures for collecting and administering fines resulting from an offence to the provisions of the Electricity Act and those arising from false declarations
- 1.14 Decision on the fees to be prescribed under the Electricity Act
- 1.15 Feed-in tariff policy

# 2. During the transition period (up to 2020)

- 2.1 Decision on the Voltage threshold between transmission and distribution grid
- 2.2 Decision on the manner in which electricity shall be measured and the standards of measurement which shall be employed and the manner in which electricity is permitted to be, or is prohibited from being used
- 2.3 Decision on qualifications to be possessed by persons, before they may be entrusted with the construction, erection, repair or alteration of any installation or apparatus or with the charge of any installation or the control of the operation of apparatus
- 2.4 Decision on the nature of the tests to be employed for ascertaining whether persons possess the qualifications prescribed, the form and period of validity of certificates to be issued to persons found to possess the said qualifications and the fees to be paid for such test and certificates
- 2.5 Decision on measures to be taken and the fittings to be supplied and used in connection with installation in order to secure public and private safety
- 2.6 Decision on the manner of holding an enquiry under the Electricity Act
- 2.7 Decision on form of notices and the manner of service
- 2.8 Decision on determining and publishing norms and standards for the electricity sector accepted in Sierra Leone
- 2.9 Set-up Rural Electrification Fund for co-financing priority projects (electricity Access, Renewable Energy, Energy Efficiency) jointly with MOFED
- 2.10 Commission a second phase of the Electricity Network Investment plan
- 2.11 Commission an off grid rural electrification master plan study
- 2.12 Conditions for devolving central powers to local councils for organising off grid electricity local supply
- 2.13 Definition of the functions of a Transmission System Operator
- 2.14 Energy efficiency policy instruments
- 2.15 Decision on the creation of a modern energy access Authority spun off from EDSA
### 3. During the delivery period (after 2020)

- 3.1 Adoption of an integrated resource plan for the electricity sector including the view of local authorities for the development of local electricity supply services and using the results of a willingness-to-pay survey
- 3.2 Renewable energy atlas with potential renewable energy sites with high levels of granularity to allow for assessment across a wide range of electricity supply services options
- 3.3 Streamline the siting and permitting process for new electricity supply projects
- 3.4 Implement testing programmes to document the safety and performance of electricity supply technologies, based on published standards and protocols.

## 2.11. Role of the Ministry of Finance and Economic Development

Everywhere it is said in the Roadmap that the Ministry of Finance and Economic Development will provide finance to the government owned entities of the sector (EDSA and EGTC), it does not mean subsidy. In the past, the electricity sector has not contributed to the fiscal budget and has been a drain, with the exemption of GST on electricity sale, tax waiver on fuel for power plants, duty waiver on imported goods, repayment of concessional loans under sovereign guarantee clause and any other loan with sovereign guarantee, payment of salaries of staff of EWRC, and direct subsidies to the sector.

This will change and has already started to change in December 2016 with the collection of GST on electricity sale.

During the recovery and transition period of the roadmap, MOFED will manage the financing of the sector by setting up financing instruments in collaboration with bilateral donors and international financing institutions. The purpose is to attract budget finance during the period where the sector still experiences deficit and to setup blending finance products that will maximise the leverage on grants with concessional loans, commercial loans (including from local financing institutions) and private finance.

Any activity of the state-owned public utilities with a quantifiable financial benefit shall be financed by (affordable) loan and not by subsidy or grant; grant or equity injection shall be considered only when there is no direct quantifiable benefit that results from the targeted activity (e.g. building of a new headquarter); public equity injection should also be considered to raise the borrowing capacity of state-owned public utilities (once they become bankable).

MOFED is entitled to receive repayment of any loan to a state-owned public utility and dividends for any equity injection. In case of repayment by MOFED, under the sovereign guarantee clause, of a concessional loan made to a public utility for an investment whose commissioning has been delayed (like Bumbuna I), MOFED is entitled to set-up a fee payable by the users of the facility in order to compensate for the repayment of the loan by MOFED.

The action plan for MOFED follows:

### 4. During the recovery period (up to mid-2018):

- 1.16 Design the Collection Bank (jointly with MOE)
- 1.17 Design the Independent Agent managing the Collection Account (jointly with MOE)
- 1.18 Perceive a tax for the use of Bumbuna dam (as a result of repayment of concessional and top-up debt from State budget and not from the accrued value of generation output of the dam)
- 1.19 Create a collection account for fines resulting from the violation of the provisions of the Electricity Act and false declarations

- 1.20 Set-up financing instrument for paying bill arrears by public institutions (Ministries, hospitals, schools, military facilities, national printing house)
- 1.21 Grant short term loan to EDSA for financing IPP payment and to EGTC for Fuel payment
- 1.22 Grant medium term loans to EDSA and EGTC for financing short payback technical loss reduction programme (EDSA and EGTC)
- 1.23 Grant medium term loan to EGTC for financing procurement of long lead time spare parts and for rehabilitating workshops
- 1.24 Grant long term loan to EDSA for financing outstanding debt to EGTC and Addax
- 1.25 Tax relief on Heavy fuel oil for licensed generators and solar PV products

#### 5. During the transition period (up to 2020)

2.16 Set-up Rural Electrification Fund for co-financing priority projects (electricity Access, Renewable Energy, Energy Efficiency) jointly with MOE

#### 6. During the delivery period (after 2020)

- 3.5 Confirm 15 years corporate tax relief on infrastructure projects with development costs exceeding USD20 million
- 3.6 Determine maximum cash injection in the Electricity Sector
- 3.7 Determine maximum national exposure to foreign exchange liability

### 2.12. Role of the Steering Committee

Coordinating the implementation of the Roadmap will be the most important priority of the Steering Committee over the next three years and beyond. This means supporting the electric public utilities with the appropriate resources, advocacy, advice, and priority setting, they need to be successful. It also means monitoring, probing, and holding the utilities' senior executive team accountable for real change.

The Steering Committee has already formally confirmed that the Roadmap will be its way forward for the next three years, including performance goals and objectives that the utilities will measure and report to the Steering Committee quarterly and annually.

Because culture change is so central to the reform, the steering committee shall pay particular attention to this area. Also, because culture change is a specialised challenge, it is recommended that the steering committee appoints an independent advisor with strong experience in complex change management to provide it with advice and perspective.

The action plan for the Steering Committee follows:

#### 1. During the recovery period (up to mid-2018):

- 1.1 Approves the roadmap scorecard submitted by MoE
- 1.2 Coordination of the emergency recovery plan for the electricity sector

#### 2. During the transition period (up to 2020)

2.1 Coordination of the roadmap implementation plan

#### 3. During the delivery period (after 2020)

3.1 Coordination of the roadmap implementation plan

## 3.1. Commercial framework

In the current commercial framework, EDSA distributes electricity from the bulk supply points to the consumers and sells electricity. EGTC is generating from its thermal power plants and supplies the bulk substations. EGTC is buying fuel oil to run its thermal power plant and receives electricity from Bumbuna I hydropower plant through the 161 kV transmission line which is the only transmission line operating in the country. Rental thermal power plant fills part of the generation capacity gap in the Freetown area and sells directly to EDSA. Although EWRC has been established for the electricity sector under the 2011 EWRC Act, it is not yet fully functional as a result of budget and capacity limitation and adverse conditions for fully independent regulation. The situation is as follows:

On the demand side, there is a high unserved demand and a poor quality of supply that triggers most of the large consumers to secure backup supply at high cost. Some of the very large customers in the industrial area of Freetown secure uninterruptible electricity supply by pre-financing the fuel purchase by EGTC.

On the distribution and supply side, EDSA does not collect sufficient revenue to pay for all its costs. High technical and commercial losses explain part of the revenue gap. In terms of its operating expenses, EDSA is prioritising its own O&M cost and costs for connecting new customers. As a result, it does not have enough revenue to finance its own investments and pay for the electricity supplied by EGTC.

On the generation and transmission side, EGTC receives its revenue from EDSA; however, EDSA has been reluctant to agree on a power purchase agreement with EGTC that would exceed its payment capacity; EDSA has payed EGTC with cost-pass through formula, in order for EGTC to receive just enough cash to purchase fuel oil to run its thermal power plants. Recently, a memorandum of understanding drafted by EWRC was signed by EDSA and EGTC at a price of 10 US ct per kWh, far below cost recovery level for EGTC. As a result, EGTC does not have sufficient revenue to pay for its non-fuel O&M costs. Furthermore, EGTC must make a guaranteed payment in hard currency to the O&M operator of the Bumbuna I facilities that comprises the 50 MW hydropower plant and the 200 km transmission line (161 kV) between Bumbuna and Freetown. During the dry season, the capacity of the Bumbuna I hydropower plant may fall from 50 MW to well below 15 MW. As a result, there is insufficient generation capacity to meet the demand, triggering additional load shedding. Furthermore, the existing generation capacity has a poor utilisation rate as a result of constraints on the purchase of fuel oil.

As the unbundling of NPA (into EGTC and EDSA) has not been fully completed, the two companies do not hold the title deeds of their assets, and there is no audited financial statement for the new entities. As a result, neither of these companies is bankable nor are they in a position to raise debt in commercial banks to finance their operation and expansion.

# 3.2. Electricity demand constraints

The country's **energy demand** is massively underserved with estimates of unmet demand continually increasing.

**Urban demand** - With a population of 6.4 million inhabitants, there are around 1 million households in Sierra Leone, of which 40 percent (i.e. some 400,000 households) live in urban areas. In 2015, only around 30 percent of the urban population had access to electricity (i.e. around 120,000 households). In order to reach the electricity access policy objectives of the urban population (66 percent by 2020 rising to 99 percent by 2030) and considering that the share of urban population will increase from 40 percent to 50 percent by 2030, it will be necessary to connect around 40,000 new households per year. Over the period 2014-2016, EDSA has made an average of 25,000 new connections annually, which is 15,000 less than that needed to be on target to meet of policy objective.

**Rural demand** - Some 600,000 households live in rural areas. Around 13 percent of the rural population has access to electricity (i.e. around 80,000 households). In order to reach the electricity access policy objectives for the rural population (20 percent by 2020 and 85 percent by 2030), it will be necessary to provide electricity supply services to around 15,000 new rural households per year.

**Industrial demand** - The estimates for energy required by the 3 largest mining companies range between 138 MW (source National Mining Association) and 680 MW (source: Ministry of Energy) for 2018. The Government is encouraging these companies to move away from vertical integration in their production processes, in order to make room for separate private investments in electricity generation, transmission and distribution.

**Regional export markets** - Sierra Leone's inclusion in the regional West African electricity market offers opportunities for the transmission and export of locally generated energy to neighbouring countries (Guinea and Liberia), which are also experiencing severe power shortages. It gives also opportunity to import low cost power from Cote d'Ivoire.

## 3.3. Supply side constraints

Current supply capacity is inadequate to meet the power demand of existing (and future) connected loads. This insufficient supply capacity is the result of (i) insufficient installed generation capacity with regard to the peak load, (ii) inadequate hydro/thermal generation mix as a result of the high seasonality of existing hydro generation, (iii) constrained evacuation capacity through the existing transmission and distribution infrastructure and, (iv) high system losses.

## 3.3.1.Deficit in installed generation capacity

The completion of the Bumbuna hydroelectric power project Phase 1 (50 MW installed capacity) led to an increase in the electricity supply with an estimated peak supply of 40 MW during the wet season, and only 11 MW during the dry season. A second thermal project in the east end of the capital city increased the available capacity by a further 16.5 MW added to the 10 MW supply that was already in place at the Kingtom power station.

### 3.3.2.Inadequate generation mix resulting in insufficient reserve capacity

Given Sierra Leone's high reliance on seasonal hydropower, heavy fuel oil (HFO) based generation has been identified as the only feasible alternative for delivering reliable, all-year around electricity services in the short to medium term. This is valid until a new hydro scheme (e.g. Bumbuna Phase II) is developed with an improved availability during the dry season or the interconnector enables the import of low cost power during the dry season (27 MW committed from Transco CLSG).

### 3.3.3.Constrained evacuation capacity of the network

In 2015, the evacuation capacity to supply the load in Freetown area was assessed at 42 MW. Considerable efforts are being made to increase the evacuation capacity. It is expected that in 2022, the evacuation capacity towards the western urban area will increase to 195 MW.

## 3.3.4. High system losses

The power sector infrastructure is highly inefficient. In 2016, distribution losses (technical and commercial) were assessed at 35 percent of electricity purchases by EDSA. Considerable efforts are being made to overcome the low efficiency situation through new and rehabilitation investment in generation, transmission, distribution and management systems and approaches. It is expected that in 2022, the distribution losses will be brought down to 22 percent.

## 3.4. Demand / Supply Balance

For 2015, the unconstrained demand for electricity (including mining sector demand) is estimated at 256MW of which residential demand is estimated to be 203MW and mining demand 53MW. The constrained demand is around 103MW disaggregated as follows: 50MW constrained domestic demand (of which about 40MW in the Freetown areas and 10MW in the rest of the country), and 53MW from the mining industry (provided through auto-producers serving a captive load). The total national generation capacity (excluding auto-producers) amounts to 78.5 MW.

### 3.5. Financial constraints

The financing requirement to meet the GoSL's policy objectives for the electricity sector up to 2030 amounts to around USD 1,500 million. As a result, the annual financing requirement over the next 15 years will average USD 100 million per year. The financing instruments are a blend of equity, debt and grant. The financing sources will come from local source (customer connection fee and government equity share), local and international private partners (equity investors), local financing institution (non-sovereign commercial debt), international financing institution (sovereign concessional debt, guarantee instruments), and donors (grants, blended finance). The non-credit worthiness of EDSA (as off-taker) does not help in mobilising funds and requires complex cash management instruments. Furthermore, EGTC is not in a position to mobilise funds to expand generation or transmission capacity and can only manage sector development programmes financed by loans and grants of international development institutions channelled through MOFED.

By 2020, the annual electricity sector deficit is assessed to range between USD10 million per year (source Ministry of Energy) and USD40 million per year (source: World Bank). Therefore, the electricity sector is expected to remain dependent on government subsidies in the medium term. The higher the demand of the connected mining sector, the lower will be the sector deficit. Although there is a high degree of uncertainty in this matter.

# 4. Vision for the electricity sector up to 2030

Setting a vision for the future is the process of defining the desired pathway for the reform of the electricity sector in order to deliver the GoSL's policy goals. This process includes modelling and scenario analysis, which are important tools used to define possible intermediary states of the reform process. Modelling assesses fundamental data on population growth, increasing access to electricity services, shifting the primary energy mix, and economic growth projections to suggest the growth pathway of the electricity sector and its environmental consequences. Such analyses can also inform how the desired intermediary states move from the current situation through to how the various transitional state options may be achieved.

The road-mapping process has included a **vision workshop** where leading experts met to discuss and ultimately define by consensus, the desired pathway of the electricity sector in order to meet the policy goals. Vision workshop participants included Government and Regulatory leaders, as well as senior representatives of public utilities. At the workshop, participants considered the trends that are driving the evolution of the electricity sector, examined baseline data and scenario forecasts for future developments, and then decided upon the pathway to meet the objectives for growth and sustainability of the electricity sector.

## 4.1. Drivers associated with the vision

The main drivers associated to the vision for the electricity sector reform are as follows:

## 4.1.1. Driver 1: High Electricity Demand growth

High demand growth reflects the economic growth fundamentals for Sierra Leone which rely on the electricintensive extractive industry and the primary transformation of minerals. This high demand growth is also based on increasing access to electricity and an improving standard of living for the population. Moreover, high demand growth is critical to attracting the private sector and making its investments financially sustainable.

### 4.1.2. Driver 2: Timely investment in adequate generation capacity

Well defined generation projects and a procurement process that is attractive for the private sector will enable adequate generation capacity. Furthermore, the right mix of low cost renewable capacity and high cost fossil fuel capacity is likely to result in tariffs that are affordable to consumers.

## 4.1.3. Driver 3: Timely investment in networks

Network investment is required to transmit electricity from low cost renewable energy sites to urban centres. It is also required to interconnect urban centres. Network investment is also required to distribute electricity from bulk sub-stations to every connected consumer. This will require rehabilitation and strengthening works to improve the quality of service for existing customers and serve a growing density of customers; it will also require distribution grid extension works to serve new customers in peri-urban areas.

## 4.1.4. Driver 4: Beyond the grid investment

Considering that network investment will take time to build in order to deliver low cost and abundant electricity to the connected end users, beyond-the-grid investment is required to provide electricity services in areas remote from the grid. Furthermore, the high proportion of low income citizens in the population creates a large market segment of social electricity customers that is not always cost effective to connect, even when they are located close to the grid. As a result of the technical progress of off-grid technologies and the global price decrease of isolated electricity supply devices, there is a vibrant market for electricity self-production solutions carried out by the private sector. Based on this market trend and the potential failure of the private sector for service delivery to the low income consumers (vendors will target high profit and rich customer segments), a cost effective and inclusive off-grid electricity supply public services and (ii) beyond the grid supply. This makes feasible the policy goals of universal access to electricity by 2030.

## 4.1.5. Driver 5: Capacity building

One of the most critical conditions for effectively delivering on the vision is to focus on raising awareness and building capacity of the institutional players in the electricity sector. Specifically, this should be aimed at innovative policy instruments developed by the GoSL, the regulatory processes developed by the EWRC and the upgraded, improved planning functions, enhanced or completely new functions required to operate the various business activities in the electricity sector.

## 4.2. Structure of the Power Sector – horizon 2030

The "2030 Structure" offers an overview of a preferred future configuration for the sector. It takes into consideration GoSL's policy priorities, which include increasing access to electricity, additional IPP involvement and sector financial viability, but is flexible enough to adapt to developments and opportunities that arise. This model offers a platform by which growth and expansion can be delivered.

## 4.2.1. Institutional Framework

- The Ministry of Energy focuses on policy and legislation, and maintains a strategic oversight of the sector.

- An IRP - developed on least-cost principles - is maintained on an ongoing basis. This is the foundation for timeous generation procurement driven by customer demand and transmission expansion;

- EWRC is equipped with the necessary powers and capabilities to function as an independent regulator. A comprehensive regulatory framework is in place. EWRC has full responsibility for determining tariffs on cost recovery base within affordability limits set by GOSL. EWRC's independence in carrying out its mandated role is respected by all participants in the sector.

- A Rural electrification Agency ("Modern energy access Authority") will provide support to the implementation of the rural electrification master plan

- An "Energy Management Fund" will channel finance from GOSL and donors to project developers and consumers through local financing institutions for electricity access, renewable energy and energy efficiency initiatives

### 4.2.2. Market organisation

A bilateral market model has replaced the single buyer model where EDSA was the single buyer of electricity generated by EGTC and IPPs. Now, large 'eligible' consumers including independent distribution companies are entitled to purchase electricity directly from generators using bilateral contracts; this new market structure is enabled by the cost-reflectivity of tariff structure where large consumers pay less per unit than the households.
 All sector entities comply with sound health, safety and environmental practices, under approved policies, and maintained procedures and systems.

- A comprehensive set of commercial and operational codes and agreements is in place governing relationships between the respective sector entities. These relationships are maintained through service charges (e.g. there are use-of-system charges and connection charges for transmission) and charges are broadly cost-reflective.

## 4.2.3. Generation

- The generation capacity should reach 1800-2000 MW in 2030.

- The Generation capacity mix is dominated by large-scale hydro (800 MW - 8-12 USct per kWh) owned by EGTC and concessionaires that will return to the ownership of EGTC at the expiration of the concession agreement.

- Overall renewable energy should account for over 50% of the generation capacity mix (above 1000 MW); on top of the 800 MW of large scale hydro, there should be 140 MW of mid-scale hydro contracted under the Feedin-Tariff Policy (10-12 USct per kWh) and 60 MW of Solar PV generation capacity (@ 13 -17 USct per kWh)

- Regional scale power plant (above 200 MW) may be developed in Sierra Leone (or Mano River Union Countries) with multi-country finance and country specific off-taking agreements with a generation price of 5-8 USct per kWh.

- Option for a large scale regional thermal generation plant in Sierra Leone (300 MW coal fired or liquefied natural gas combined cycle) needs to be confirmed with regional planning (WAPP).

- The renewable generation mix requires adequate thermal generation capacity for load following, peak load and back-up (or reserve).

- Mining Companies will procure mutual reserve HFO thermal capacity built on the coast and the generation output being wheeled to the sites through the transmission network.

- Baseload liquid fuel thermal facilities built in around 2020 (with a price of 20-25 USct/kWh) will be retired at the expiration of their license or converted into load following or peak load facilities.

- The thermal generation capacity should account for 40% of installed capacity but less than 20% of power output

- Generation capacity contracted through the CLSG interconnector will account for 5% of overall installed capacity (around 100MW)

- The cross subsidisation of decentralised thermal generators serving rural customers by large hydro generators in the portfolio of EGTC is minimized thanks to a policy of concessioning independent grids; this has been an enabling factor for expanding the electricity supply service in rural towns

- New generation plants are procured preferably through competitive tenders, aligned with the IRP

- Distribution licensees may develop their own generation portfolio to meet their obligation of reserve capacity

### 4.2.4. Transmission and regional interconnection

- The transmission grid will consist of 1200 km of 225 kV and 161 kV lines plus 800 km of 66 kV lines

- EGTC is transformed in a holding company with transmission subsidiary responsible for maintenance and expansion of the transmission system;

- An ISO - bundled with a basic Market Operator (MO) function - will operate and dispatch within an expanded transmission system, with the aim of meeting operational requirements at minimum cost;

- The ISO will manage the power flows between the CLSG line and the domestic grid, and represent Sierra Leone in WAPP operations and planning.

Province septentrionale Rokel Rokel Sierra Leone Moa

Figure 5 - Planned expansion of the transmission grid of Sierra Leone

Colour code: green = 161 kV; blue= 225 kV; red= 66 kV Source: ASI

## 4.2.5. Distribution

- The list of towns served by EDSA's distribution grid has considerably increased as a result of the extension of the transmission grid and is structured in regional supply divisions.

- Many isolated grids that were developed to serve rural town population have been connected to the main grid.

- Off grid private distribution licensees that have seen their isolated grid interconnected with the main grid have had the choice to convert their licence into a grid supply licence with payment of liquidated damage for retired decentralised thermal generator or terminate their licence with payment of liquidated damage for their entire assets.

- The consumers of former isolated grid developed and operated by other licensees than EDSA have experienced a decrease in tariff by conversion of their local supply contract into a national supply contract at national tariff rate

-.On grid distribution licensees will purchase electricity from EGTC, IPPs, local renewable generators under the feed-in-tariff regulation, or import.

- Local financing institutions in rural towns are providing affordable short term loans to consumers for financing connection charge, affordable medium term loans to local businesses in order to convert their facilities to electricity supply from the grid and affordable long term loans to developers of power plants capturing local renewable sources and feeding their production into the distribution grid.

- The aggregation of authorised distribution territories may not cover the entire national territory. Areas that are not covered by a distribution licence will be served by an off-grid sale licence where the licensees provide electricity supply services with individual off-grid technologies.

- EDSA will be the supplier of last resort in any location without a sale licence or where the electricity sale licence is not renewed or terminated.

## 4.2.6. Local Supply

- As part of the government strategy to reach universal access, the local authorities in rural areas far from the interconnected grid have gained the capacity to plan for local electricity supply and to contract electricity service sale licensees as well as mini grid distribution and sale licensees.

#### Structure of the Power Sector (2030)



Figure 6 - Structure of the power sector in 2030 Source: ASI

# 5. Electricity sector reform path: actions and milestones

The reform process has a transformational role to play in the electricity sector for all activities of the value chain. In consultation with expert stakeholders, a series of actions and co-ordinating timelines were developed that will facilitate the reform of the electricity sector. This Roadmap recommends a set of actions that apply across the electricity sector business segments as well as a number of activity-specific recommendations. The latter are focused on activities that appear to be particularly well suited for delivering on policy goals.

## 5.1. Knowledge base for off grid electricity supply activities

This roadmap recor	nmends the following actions	Proposed priority*
Address data challenges for existing off-grid	Create a database of off-grid electricity supply consisting of project overviews, including information on system specifications, cost and performance with contextual details.	1-2
systems	Quantify renewable energy availability and project opportunities, including details on renewable energy quantity, quality, and location for both resource availability and potential demand.	2
Address data challenges for use in assessing future off-grid electricity	Build a comprehensive dataset of renewable generation production with high levels of granularity to allow for assessment across a wide range of on-grid and off-grid electricity supply systems.	2
supply systems	Assess potential for electricity supply systems procurement in the context of the vision (technology-neutral evaluation).	1
	Conduct a wininghood to pay survey	0
Establish regional a systems scale-up, m	nd national data co-operation to foster off-grid electricity supply onitor progress and assess business barriers	1
Support pilot projects supply technologies emphasis on optimis	that incorporate the use of both conventional and renewable energy (i.e. hybrid systems) to maximise resource use efficiency, with ing the value for service	1

#### Table 1 - Knowledge base for off grid electricity supply activities

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

#### Address data challenges for existing off grid electricity supply solutions

Off-grid electric technologies are critical assets to deliver off-grid public service electricity supply, but quantifying energy supply and duration is challenging. Currently accessible datasets do not include an exhaustive list of projects or project details sufficient to establish an accurate baseline.

For the off-grid electricity supply projects that are present in existing lists, the following information is not consistently included:

- Peak available capacity (W) and duration of service during daylight (hours per day) and night (hours per day).
- ) Information on relevant GoSL and policy landscapes, funding schemes, realised fixed and variable costs, execution details, and operating constraints (intermittent power generation profile from renewable source).
- ) Details regarding quantity, quality, and location of both the supply resources and corresponding demand.

To encourage the accelerated scale-up of off-grid electricity supply technologies, the GoSL would support the development of a database of existing off-grid electricity projects that includes the above details. This effort could partner with existing efforts at regional level. Once this dataset is established, it should be routinely updated as new data become available.

#### Address data challenges for use in assessing future off-grid electricity supply potential

Once a baseline is effectively established, new off-grid electricity supply technology can be assessed beyond a basic level. However, additional data will be required to quantify energy supply service by user profile. Primary challenges include a lack of easily accessible renewable energy production and demand curve datasets with sufficient levels of granularity (sub-hourly level) reflecting observed system behaviour across long time frames and various sites in the country. Access to these types of datasets will allow for the detailed modelling and quantification of the supply service potential (technology-neutral) across the country.

In evaluating off-grid technology, attention should be paid to other technology options that could supply the same electricity at lower cost (e.g., on grid and off grid mini-grid options).

Regional and national data co-operation can foster off-grid electricity systems evaluation, monitor progress and assess the bottlenecks. Major discrepancies in current and future off-grid technology costs show the significant uncertainty around future off-grid technology progress.

## 5.2. Procurement Framework for Generation Capacity

#### Table 2 - Procurement Framework for Generation Capacity

p recommends the following actions Proposed priority*	This roadmap recommends the following actions
of Energy (MoE) will issue procurement framework guidelines that map both 0	The Ministry of Energy (MoE) will issue procurement framework guid
d and solicited processes. MoE will receive support from the Public Private	the unsolicited and solicited processes. MoE will receive support fro
Init.	Partnership Unit.
vill develop regulatory adequacy instruments in order to encourage a timely 1	The EWRC will develop regulatory adequacy instruments in order t
guacy	capacity adequacy
quacy	capacity adequacy

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

For the interconnected grid, the pipeline of least cost projects to be developed in order to meet the demand over the next 10 years is well known. Critical projects are the 128MW Western Area Generation Project, the CLSG interconnector, the Bumbuna II hydro project and the 225 kV transmission line between Bumbuna II and Waterloo (Western Area), the increase of the distribution capacity of Freetown, and reduction of grid losses.

For the isolated systems, the priority projects are those which will electrify the district capital cities. These projects are a GoSL priority. Critical projects are also the identified 50 health centres to be electrified in rural area across the country (6 kW packages Solar PV and battery storage systems) which will also serve as demonstration projects for successful renewable energy expansion.

A carefully defined procurement process enables these priority electricity infrastructure projects to be converted to contracted facilities; the procurement framework shall make solicited and unsolicited projects complementary and not disruptive of each other; currently, most of the projects are brought in through unsolicited arrangements. Solicited projects through competitive bidding are expected to lead to lower prices and an improved predictability of electricity supply through budget and capacity control. However, in some cases, auctioning is not appropriate, such as small scale projects (up to 3-5 MW in the context of Sierra Leone) that would be eligible for the renewable energy feed-in tariff (FIT) as outlined in a future FIT policy. Bilateral negotiations with preferred bidders are also preferable for large scale project sites (over 50 MW in the context of Sierra Leone).

The market arrangement and procurement process shall lead to timely generation capacity adequacy. There is currently insufficient capacity adequacy in the power system of Sierra Leone. Sierra Leone is using 'emergency power rental' as the only practical 'safety net' mechanism for generation capacity adequacy. The IPP procurement process will ensure that there is sufficient capacity to meet demand. Regulatory obligations are necessary to ensure that the required capacity comes on line in a timely manner.

It is proposed to make it obligatory for distribution licensees (EDSA and any other distribution licensee yet to come) to procure or contract an amount of generation capacity that exceeds its peak customer demand by an agreed margin as determined by the EWRC. This margin will depend on the availability of the generation mix connected to the grid (or mini-grid). An option is to include in the generator licence (and therefore in the specification of new IPPs) an obligation to maintain a minimum amount of firm power capacity available in order

to control the level of generation intermittency, or seasonality or availability at a given date (e.g. targeted Commercial Operation Date).

# 5.3. Rural Electrification and off-grid

#### Table 3 - Rural Electrification and off-grid

This roadmap recommends the following actions	Proposed priority*
An off grid regulation to be developed by the EWRC; this regulation will cover individual	0
off-grid electricity supply services and isolated mini grid electricity supply services and will include off grid licence templates.	
The EWRC will also have to develop a specific connected mini grid regulation with a connected mini grid licence that would be an option for succession of an isolated mini grid licence, should the main grid be extended to the territory of the isolated mini grid. Another option would be the absorption of the mini grid infrastructure by the distribution licensee and indemnification of the off-grid licensee. As a result, both isolated mini grid regulation and connected mini-grid regulation will form the mini grid regulation of Sierra Leone.	0
The EWRC will set-up conditions and modalities for the application, award and repeal of accreditation for the exercise of other activities in the electricity sector including for suppliers of individual off-grid systems to be used as part of the regulated public service of electricity supply	0
At some point in the future, the MoE could specify the conditions for devolving its powers for organising off-grid electricity supply services to local authorities, in the spirit of the Local Government Act of 2004	2
priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 20	)30

The market arrangement shall enable the scaling-up of electrification. A split market emerges as the best option: centralised for on-grid supply services and decentralised for off-grid supply services. The Electricity Act acknowledges electricity supply as a standalone activity and makes possible to licence public utilities to supply electricity through individual off-grid systems.

## 5.4. Renewable Energy IPPs

#### Table 4 - Renewable Energy IPPs

This Roadmap recommends the following actions	Proposed priority*
The MoE will issue an energy policy update that will reconcile and simplify (based on their alignment and relevance with the roadmap) the various reference policy documents for the energy sector (Energy Policy 2009, Policy Letter 2016, Renewable Energy Policy 2015, Energy Efficiency Policy 2015). The Renewable Energy Section of the Energy Policy Update will call for the development of a Feed-in-Tariff Policy as a policy instrument to support Renewable Energy.	0
The Ministry of Energy will detail a feed-in tariff policy that will specify maximum feed-in Tariff levels for specific technologies (hydro, solar PV, solar thermal, wind, biogas, biomass, marine) and different capacity ranges between 500 kW (minimum capacity) and 3-5 MW (maximum capacity) and the connection modality (on grid / off grid).	1

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

The capability of the market arrangement to capture renewable energy at various scales for additional power generation is also a critical issue. The contribution of small scale unit size renewable generators into the fuel mix should not be neglected. The decision on specific renewable energy policy support instruments would follow a policy update in order to merge and straighten the Energy Policy 2009, the Policy letter 2016, the renewable energy policy 2015 and the energy efficiency policy 2015. The envisaged policy update would include a detailed feed-in-tariff policy.

Additional features of the feed-in-tariff policy would include:

- i. that the feed-in-tariff should never be above the long term marginal generation cost of the grid as proposed by the regulator (using the IRP) (for example:12 US cents / kWh for grid connected projects).
- ii. there will be a cap on the maximum intermittent capacity to be connected to the grid in order to comply with the capacity limit of national grid for absorbing intermittent generation. Prices will be determined in hard currency (e.g., USD, GBP, EUR or others) for average conditions of local resource (possibly per zone).
- iii. the price shall be fixed for a period exceeding debt maturity of projects (12 to 15 years max).
- iv. the risk of payment default of off-taker shall be mitigated by a guarantee instrument (excluding sovereign guarantee).
- v. technical default of off-taker preventing the grid to off-take the electricity generated by the renewable energy project shall be mitigated by an energy compensation formula (similar to a take-or-pay clause).
- vi. in order to reduce the transaction cost and fast track delivery, the power purchase agreement for eligible projects shall be standardised and non-negotiable.

## 5.5. Regional Market Integration

#### Table 5 - Regional Market Integration

This Roadmap recommends the following actions	Proposed priority*
The Ministry of Energy will specify the functions of a Transmission System Operator to be operationalised by EGTC.	2
The EWRC will establish a roadmap for integration of the Sierra Leonean Electricity System with the Regional Electricity Market of West Africa and progressive establishment of trading functions (including establishment of a market operator).	2
The EWRC will also validate the dispatching rules established by the Transmission System Operator.	2

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

The market arrangement shall unlock the benefits of the regional electricity market that includes higher levels of energy security and the avoidance or deferral of construction of new power plants (and a reduction of the reserve capacity requirement). A Transmission System Operator (TSO) should manage the interconnector as another part of system operation and an interchange agreement would be reached with the system operators on the other end of the interconnector.

The functions of transmission market operator include:

- (i) security of supply through adequate system reliability including priority for mutual back-up through interconnector,
- (ii) management of energy flows on the system as per contract requirement including unscheduled flows and transits,
- (iii) control of the voltage plan,
- (iv) dispatch of generating installations and the use of the interconnector,
- (v) non-discrimination between users (generators, distributors, and, later, eligible customers) but priority of access for renewable energy generators if required by the policy,
- (vi) information exchange with the sub-regional system balancing manager based in Guinea and the WAPP information Centre based in Cotonou,
- (vii) establishment of dispatch rules in compliance with the grid code.

## 5.6. Attracting Private Investment

#### Table 6 - Attracting Private Investment

This Roadmap recommends the following actions	Proposed priority*
Amendment of the Electricity Act by the Parliament on a proposal submitted by PPPU and validated by MoE in order to enable the establishment of the Collection Account	0
Development of a sector wide budget under the leadership of PPPU to be approved by the EWRC	0
Development of an operation manual of the Collection Account (under the leadership of the Public-Private Partnership Unit (PPPU), establishment of the Collection Account Committee (driven by PPPU) and establishment of an accredited list of suppliers and accredited process (managed by the Collection Account Committee)	0
Cabinet decision on the Financial regulation of the electricity sector (including in appendix the operation manual of collection account)	0
Accounting unbundling of the generation and transmission business activities of EGTC under the oversight of the EWRC; set-up of a transmission tariff	0
Decisions of MoE/MOFED including (1) designation of the Collection Bank (following a procurement process supervised by PPPU), (2) designation of the Independent Agent (following a procurement process supervised by PPPU)	0
priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 20	30

Attracting private investment is challenging in an unbundled market structure where the retail price is controlled by the Government. A Collections Account operated by an Independent Agent needs to be created including a cash waterfall arrangement that provides a payment guarantee for the priority payments.

The highest priority is given to government tax and levy in order to contribute to the public budget. The second priority is given to the payment of operation and maintenance expenses in order to maintain the integrity of the electricity supply service. The third priority is given to the payment of investment charge of private investors (also pari passu of PPP projects). The fourth and last priority is given to the payment of public investment charge not covered by a guarantee instrument (other than sovereign guarantee).

With such an arrangement, the Government bears the full responsibility of insufficient revenue due to price set below cost recovery level. The GoSL will therefore manage the trade-off between subsidy injection in the sector and electricity prices. As a result, it is expected that a policy for phasing out the sector deficit will be set in place, through progressive tariff increase, reduction of the cost of the generation mix, increase of the transmission capacity and improved efficiency of distribution and sales.

### 5.7. Performance improvement

### Table 7 - Performance improvement

This Roadmap recommends the following actions	Proposed priority*
The EWRC will restructure the tariff by inverting the slope of the tariff function from currently positive to a negative one. This will be possible only after the structural conditions for a tariff decrease are met.	3
The EWRC will develop a new tariff with a cost pass-through formula for fuel cost and foreign exchange fluctuation. This will be possible only after the structural conditions for a tariff decrease are met with a significant decrease of the quantity of fuel oil for generation.	3
The Ministry of Finance will waive duty and excise tax on heavy fuel oil for Licensed generators in order to make affordable the price of electricity generated with a high share of thermal plants in the short term.	1
EDSA signs a management contract in order to improve its operational and commercial efficiency (contract signed in 2016 for a 3 year period)	0

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

In its Policy Letter to The World Bank of June 2016, the GoSL has identified the following measures to address the performance of the sector:

- (i) equity improvement with regard to the customer base through tariff restructuring,
- (ii) financial sustainability of the electricity sector through the introduction of an Automatic Tariff Adjustment Formula (ATAF),
- (iii) affordability of on-grid tariff though the introduction of a fuel tax exemption for Heavy Fuel Oil (HFO) generation,
- (iv) bankability of private investment though the establishment of a sector-wide Collection Account, and (v) operational and commercial efficiency of EDSA through the appointment of a management contractor.

# 6. Policy, law, regulation, and finance: actions and milestones

There are several drivers that support the growth of the electricity sector, including economic and population growth, increasing energy access, rehabilitation and strengthening of constrained and aging electricity system infrastructure, and an emphasis on low cost renewable energy technologies both centralised and decentralised. At the same time, many factors influence the growth and spread of electricity supply services beyond technology cost and performance.

The widespread scale-up of electricity supply services is particularly dependent on achieving acceptable cost recovery. Current policy environments and market conditions often cloud the cost of electricity supply services, creating significant price distortions (e.g. by requiring on grid service extension in rural areas to pay the same price as in urban areas, obscuring the higher cost of supply).

Unless cross-subsidies for electricity access services in rural areas are provided – or the level of service and technology choice is adjusted to make the cost of service congruent with the affordability constraint – high penetration of electricity access will be difficult to achieve and electricity access in locations remote from the grid and for low consumption households will be left to unregulated commercial arrangements with already observed market failures where poor consumers are mostly excluded.

A key to achieving the scale up of widespread electricity access is by enabling a split market to emerge: centralised for on-grid supply services in urban areas and middle class, and decentralised for off-grid supply services in rural area and poor consumers. The Electricity Act acknowledges electricity supply as a standalone activity and makes it possible to licence public utilities to supply electricity through off-grid systems.

The current financial constraints make it difficult for utilities to invest in infrastructure projects, including densification of connections and expansion of distribution grid to capture new customers in unserved areas. It also amplifies the risk-averse inclinations of utilities, as well as existing inertia toward traditional on grid supply technologies.

The Government of Sierra Leone (GoSL) has already acted in support of off-grid electricity supply project development, through efforts such as direct financial support of demonstration projects blended with donor grants.

Moving to comprehensive market transformation to roll out the off-grid policy of the GoSL and scale-up off grid electricity supply to electrify the rural population through market based approach is another step that is an integral part of this Roadmap.

In supporting off-grid electricity supply public service, the policy takes into consideration local dynamics such as variable renewable energy availability, policy and social development goals, electricity demand profiles and willingness to pay of consumer categories.

The ability of scaling-up off-grid electricity supply public service through a purely market-driven approach is greatly inhibited by a lack of price transparency, high upfront investment costs, and significant distortions of the price of electricity. Some potential mechanisms for addressing this problem include time-of-use pricing, pricing by service, and taxation.

## 6.1. Policy instruments

#### Table 8 - Policy instruments

This roadmap recommends the following actions	Proposed priority*
Energy policy update	0
Electricity Sector procurement framework	0
Anti-theft Policy	0
Feed-in Tariff Policy	1
Energy Efficiency incentives	2

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

An updated Policy would encourage the scale-up of electricity supply services in remote localities where off grid technologies are already broadly competitive or near-competitive. In these cases, third-party verification of off grid electricity supply project performance could become prime case studies for later implementation in other regions. Furthermore, off-grid areas provide an additional opportunity for off grid electricity supply services demonstration projects and case study development. These locations also allow the opportunity for incremental gains through the capture of competitive local renewable energy resources.

Policy would be geared toward incentivising the scale-up of off grid electricity supply services through innovative financing and compensation for reaching the poor population.

## 6.2. Amendment of Acts

#### Table 9 - Amendment of Acts

This Roadmap recommends the following actions	Proposed priority*
1 <sup>st</sup> Amendment of Electricity Act aiming at (i) enabling the establishment of the sector wide Collections Account (ii) allowing inflation adjustment of fines specified in the Electricity Act to keep them deterrent, and (iii) allowing, in certain conditions, the transfer to local councils of isolated generators of EGTC and isolated distribution grids of EDSA and Eligible Customers in restrictive conditions that does not affect negatively EDSA	0
2 <sup>nd</sup> Amendment of Electricity Act aiming at (i) unbundling EGTC in EGC and ETC, (ii) Enabling Eligible Customers to set-up bilateral contracts as exception to the single buyer market model	3
3 <sup>rd</sup> Amendment of Electricity Act aiming at enabling privatisation of EDSA, EGT and ETC	3
New Electricity Act repealing the single buyer market arrangement and establishing a decentralised market	3

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

An amendment of existing Act(s) is necessary when

- (i) the reform process requires a specific enabling legal disposition
- (ii) the reform process requires a specific improvement in governance provided for in the Act,
- (iii) the reform process marginally modifies the market arrangement or institutional framework provided for in the Act, or
- (iv) the existing Act(s) may be opposed to the desired reform process.

When the reform process completely changes the market arrangement or institutional framework provided for in the Act, then the existing Act becomes obsolete, is repealed and shall be replaced by a new Act.

### 6.3. Regulatory processes

#### Table 10 - Regulatory processes

This roadmap recommends the following actions	Proposed priority*
Performance obligations of Licensees	0
Off grid Licences	0
Tariff restructuring in order to eliminate price distortions and increase price transparency	3
for electricity services (e.g., time-of-use pricing schemes, pay-for-services models)	
Additional regulatory regimes (other than Licence) for small size systems (authorisation,	0
declaration, freedom)	

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

The licence is a contract between the licensee and the regulator (in this case the EWRC) that is used to carry performance obligations aiming at achieving policy goals. For example:

- (i) distribution and sale licence will bear an obligation to reduce grid loss and to connect a minimum number of new customers,
- (ii) The generation licence will bear an obligation for reserve capacity and ramp-up rate,
- (iii) The transmission licence shall bear an obligation on maximum frequency of incidents, and
- (iv) The sales licence will bear an obligation for minimum collection rate.

Off grid licences will intend to regulate off grid electricity supply activities which are currently entirely left to unregulated commercial transactions. The purpose is to correct market failures with regards to supplying electricity to poor consumers and to carry policy objectives for off grid electrification. In particular, the off-grid licence will bear an obligation to develop a sustainable schedule of off grid electricity supply offers adapted to the needs and willingness-to-pay of each household segment including the poorest consumers. Only the off-grid electricity and service supply activities (e.g. pay-as-you-go business model) will be regulated as per the requirement of the Electricity Act. Other business activities in the off-grid activities intending to sell off-grid equipment to the population (e.g. pay-to-own business model) will not be regulated as a public service. However, they could be subject to a permitting and accreditation process managed by the MoE.

Tariff restructuring is a major development that is expected to bring more transparency and eliminate distortions that are conducive to anti-economic behaviour contrary to the policy goals. In particular, the slope of the tariff function that is currently increasing, effectively for social reasons (the large consumers cross subsidise the small consumers) should be decreasing to reflect the cost of supply to various customer segments. Since the ability to increase the tariff of the social customer and households is limited, tariff restructuring will only occur when the conditions are met for a global decrease of the average tariff. This will only happen when the fraction of thermal power plant in the generation mix is greatly decreased in the delivery period of the roadmap.

The Electricity Act recognises licensing as the only regulatory regime for all activities in the electricity sector. For the sake of practicality, a threshold size shall be considered under which the strict conditions of a licence (including the burden of reporting to the EWRC and effective verification by the EWRC) does not apply. It is proposed a progressive, light-handed regulation regime for mall scale activities could be one of authorisation, declaration and freedom below a threshold (e.g. 10 kW).

## 6.4. Incentivising investment

This roadmap recommends the following actions	Proposed priority*
Facilitate entry for off-grid investors through decentralised market mechanisms for off- grid electricity supply service and adequate tariff structure to support expansion of the service in order to reach the poorest consumers in the population	0
Clarify the role of off-grid technologies in the public service electricity supply through defining ownership structures and ownership eligibility	0
Streamline the financing process for off-grid electricity supply activities, with clear guidelines on documentation requirements	0
Incentivise the co-financing of distributed electricity generation technologies using renewable energy after assessing the risks and benefits	1
Targeted support for off-grid electricity supply demonstration projects and financial support of early movers for new commercial-scale projects (e.g. through risk guarantee schemes)	0

#### Table 11 - Incentivising investment

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

While policy and regulatory reform can create a more attractive environment for electricity supply investments, further action is needed to incentivise widespread investment. Efforts should especially be made to clarify ownership structures in ways that enable individual off-grid technologies to be used.

Furthermore, both on-grid connection and off-grid supply systems would benefit from more transparent means for securing financing. For on-grid connection, the process of securing financing should be streamlined, with requirements for the information needed to successfully support financing attempts. For individual off-grid

supply systems, there would be many benefits from co-financing opportunities for generation resources with integrated storage (e.g. residential PV systems with onsite battery storage, or water heaters with thermal storage).

Easy entry into, and exit from, energy markets is also a key to incentivising investment, allowing new companies to provide electricity supply services in the market. This ease will allow for new technologies to reach more rapidly market scale critical mass to reduce transaction costs. On the demand side of the energy system, the adoption of cost recovery tariff structures might help support individual off-grid electricity supply services and help catalyse customer adoption and use of these technologies.

Another key component in moving innovative electricity supply service delivery in rural areas lies in targeted financial support in demonstration projects, as well as risk guarantee schemes. By supporting key demonstration projects, the Government can not only help move service delivery on the growth path but also gain useful data and knowledge of best practices that can be applied in widespread scale-up efforts.

# 6.5. Planning and Permitting

#### Table 12 - Planning and Permitting

This Roadmap recommends the following actions	Proposed priority*
Develop a widely accessible clearinghouse for off-grid electricity supply service project information and other data needed to support project proposal evaluations	1
Electricity network investment plan – phase II	2
Off grid rural electrification master plan	1

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

The MoE will retain the sector planning function in collaboration with the other sector stakeholders in order to ensure that it matches national policy objectives, and shall develop capacity to undertake IRP. The planning function of the MOE requires coordination and oversight over the planning work stream outputs related to the respective **planning modules**:

- load demand forecast,
- least cost national generation and transmission,
- regional scale generation and interconnection,
- distribution expansion,
- financing plan,
- bulk tariff forecast,

provided by the licensed entities (EDSA, EGTC, future distribution companies, future transmission operator, IPPs) and the WAPP. Local councils shall retain responsibility for the development plan of local services including electricity off grid supply. As a result, all stakeholders planning capacity will be strengthened.

One primary barrier exists to widespread off-grid electricity supply services scale-up in terms of project planning and permitting, namely the lack of a widely accessible clearinghouse for off-grid electricity supply service project information which inhibits project proposal development and financing. This information should go beyond technical performance and cost data to include best practices and operational lessons learned. Furthermore, current siting and permitting processes for small scale off-grid electricity supply service projects can be quite long and cumbersome. Similar to on-grid electricity supply infrastructure permitting processes, this complexity adds significantly to total project costs.

## 6.6. Training and public engagement

т	Table 13 - Training and public engagement	
	This roadmap recommends the following actions	

This roadinap recommends the ronowing actions	priority*
Develop improved workforce training programmes with customised course content	1
pertaining to electricity supply options	

Dreneed

Further develop standards and testing programmes to document safety and performance	1
of off-grid electricity supply systems	
Develop and implement programmes to increase the utilisation of off-grid electricity	2
supply and demand side management systems	

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

Some electricity equipment parts of the supply service system are covered by recognised international standards, which simplify system procurement, installation and operation.

Other technologies (e.g. batteries) may be subject to inappropriate standards, because the standard-making process has not kept up with the rate of technical development. For technologies that are fast-changing, this Roadmap recommends widespread support through the development of standards and operation protocols, workforce training programmes, performance and safety testing, and consumer awareness programmes.

Combined, these actions will help to overcome NIMBYism<sup>1</sup> and other consumer acceptance hurdles. These international standards should be established in a manner that allows for easy updating with technology advancements.

Performance and safety testing can particularly help in overcoming both supply-side and demand-side consumer acceptance of electricity supply technologies, as well as improve access to financing. Actions should be taken to test and document performance and safety records for individual off-grid technologies as they are deployed in Sierra Leone. Experiences in other countries have shown how consumer awareness programmes can significantly improve adoption rates.

## 6.7. International financing institutions and donors funding

Table 14 - International financing institutions and donors funding	
This roadmap recommends the following actions	Proposed priority*
Establish a <b>National Fund for Energy Management</b> to support electricity sector development including network development, renewable energy & energy efficiency projects, and off grid projects	3
Develop <b>blended finance</b> products and <b>guarantee schemes</b> to be made available to Licensees investing in the electricity sector	1
Support <b>local commercial banks</b> to award affordable finance to Licensees of the electricity sector	2

\* priority 0 = 2017-2018; priority 1 = 2018-2019; priority 2 = 2019-2020; priority 3 = 2020 - 2030

The Ministry of Energy together with the Ministry of Finance and Economic Development will specify the conditions for the creation of the National Fund for Energy Management. It specifies the procedures for awarding grants and loans via the Fund and for signing partnership agreements between the Fund and commercial banks to channel funds to their clients using their own credit assessment procedures. It lays down the principles of eligibility, evaluation and selection of projects, and specifies the methods of governance and management of the Fund.

The financing instruments are a blend of subrogated equity, debt and grant. The financing sources will come from local source (levy and Government, budget allocation), international financing institution (sovereign concessional debt, guarantee instruments), and donors (grants, blended finance).

The Fund will also provide financial support for technical assistance and capacity development.

### 7. List of Actions by Stakeholder

<sup>&</sup>lt;sup>1</sup> NIMBY (not in my back yard). Refers to a situation where the population may approve of a new development (e.g. new housing, power plant, industrial facility etc.), but do not want it located close to their homes).

This Roadmap responds to requests for deeper analysis of the actions to be taken in order to deliver on policy goals through various transition phases of the electricity sector of Sierra Leone. It is intended to outline the various public electricity supply services options. The Roadmap has been designed with milestones that the policy maker can use to measure progress and assess efforts to ensure that the development of public electricity supply services is on track to achieve the policy goals by 2030.

Below is a summary of actions needed by stakeholders of the electricity sector, presented to indicate who should take the lead in specific efforts. In most cases, a broad range of actors will need to participate in each action. The Steering Committee with information support from the Roadmap Implementing Unit, GoSL, utilities and non-governmental organisation (NGO) stakeholders, will report to the Parliament on this progress and recommend adjustments to the roadmap as needed.

## 7.1. Urgent actions for the recovery of the electricity sector

7.1.1.Electricity Supply and Distribution Authority (EDSA)	<ul> <li>Immediately strengthen the Interim Collection Account and tighten all loopholes</li> <li>Outsource revenue management to Independent Agent and implement waterfall payment priority</li> <li>Implementation of the collection account committee</li> <li>Negotiate connection fee increase up to deep charge cost recovery level</li> <li>Explore option of leasing or otherwise of electricity assets and the hiring of Twinning O&amp;M expertise which may include EGTC workers. Tariff in each case will be negotiated with EWRC.</li> <li>Franchise and concession for grid extension and isolated grid development under Twinning Manpower Development Framework</li> <li>Contract Technical Assistance programme for change management</li> <li>Tighten Management contractor target         <ul> <li>Reduce commercial loss</li> <li>Enforce anti-theft policy including penalty payment</li> <li>Improve collection efficiency</li> <li>Fast track staff assessment and conduct staff right sizing</li> <li>Develop improved workforce training programmes</li> <li>Develop a meter installation and inspection programme</li> <li>Strengthen operations and fault repair</li> <li>Develop technical loss reduction investment programme</li> </ul> </li> <li>Receive medium term loan from MoFED for financing technical loss reduction process; write off pre-unbundling debt on fully amortised or retired assets; write off pre-unbundling payment arrears</li> <ul> <li>Sign a distribution and sale Licence with EWRC</li> <li>Receive long term finance from MoFED to rehabilitate, strengthen and expand the distribution grid</li> </ul> </ul>
	<ul> <li>Receive long term loan non NoPED for payment of outstanding bills to EGTC and Addax</li> <li>Receive payment of outstanding bills from customers</li> <li>Receive short term loans from MoFED for payment of bills to IPPs</li> <li>Increase connection fees to deep charge cost recovery level</li> </ul>
7.1.2.Electricity Generation and	<ul> <li>Receive payment of outstanding debts from EDSA</li> <li>Transfer financial decision to the collection Account Committee</li> <li>Receive payment from the Independent Agent for O&amp;M charges</li> </ul>

Table 15 - List of Emergency Actions by Stakeholder

Actions

Lead stakeholder

Lead stakeholder	Actions	
Transmission	Outsource Fuel supply Management for thermal plants	
Company (EGTC)	Complete the transfer of asset property including "title deeds" and the	
······································	corporatisation process: write off pre-unbundling debt on fully amortised or	
	retired assets	
	Write off pre-unbundling debt on fully amortised or retired assets	
	Write off pre-unbundling payment arrears	
	Contract Twinning OPM Expertise for ECTC generation portfolio	
	Device a structure of the form	
	) Receive short term loan from MOFED to pay for the fees of twinning O&M	
	expertise	
	) Receive short term loans from MoFED for payment of bills to fuel suppliers	
	Receive medium term loan from MoFED for financing technical loss	
	reduction programme	
	Receive medium term loan from MOFED to procure long lead time spare	
	parts and rehabilitate workshops	
	Receive medium term loan to rehabilitate Goma HPP	
	Receive medium term loan from MOFED to procure long lead time spare	
	parts and rehabilitate workshops	
	Contract Technical Assistance programme for change management and re-	
	engineering of EGTC functions and processes	
	• Fast track staff assessment and conduct staff right sizing following	
	assets restructuring	
	<ul> <li>Develop staff training programme targeting critical assets</li> </ul>	
	Independent distribution licensees shall be authorised	
712 Independent	for isolated gride (Bo and Kemena, Makeni and Maghuraka, Port	
7.1.3. Independent	loko and Lungar Koidu)	
Distribution	for eluctor of mini gride	
Licensees	o for cluster of mini-grids	
	Independent sales licensees shall be authorised for supplying electricity	
714 Independent	through individual off-grid technologies	
Salos Liconsoos		
	) Eligible customers shall be authorised in restrictive conditions:	
7.1.5. Eligible	<ul> <li>it must be a new customer (non EDSA existing customer) or a new</li> </ul>	
Customers	load	
	<ul> <li>contracting a new generation capacity (not already committed</li> </ul>	
	generation capacity)	
	Accredited IPPs receive payment from EDSA through the Collection	
7.1.6.Independent	account	
Power Producers	Non Accredited IPPs receive payment	
(IPP)	from licensed distributor (e.g. isolated grids and mini-grids) outside the	
	collection account or,	
	from eligible customers or,	
	) directly from MoFED (for emergency power plant rental)	
	Oversight of the emergency recovery plan for the electricity sector	
7.1.7.Ministry of	Capacity strengthening programme in the planning, engineering and	
Energy (MoE)	monitoring unit	
	Establish organisational change management team and programme at MoE.	
	focused on the people side of the change process - culture change.	
	leadership, communications, internal and external engagement processes	
	Recruit an external project management leader with strong experience in	
	business transformation and re-engineering as well as an expert in	
	communications	
	Decision on the completion of the unbundling of NPA assets to FGTC and	
	FDSA and dissolution of NPA	
	Policy on financial regulation of the electricity sector	
	Procurement framework guidelings	
	/ Koaumap scorecard	
	) Energy policy update	

Lead stakeholder Actions		
	<ul> <li>Policy on strengthened actions on Electricity theft</li> <li>Procedures for collecting and administering fines resulting from an offence to the provisions of the Electricity Act and those arising from false declarations</li> </ul>	
	<ul> <li>Decision on the fees to be prescribed under the Electricity Act</li> <li>Feed-in tariff policy</li> </ul>	
7.1.8.Public Private Partnership Unit (PPPU)	<ul> <li>Development of a sector wide budget</li> <li>Development of an operation manual of the collection account</li> <li>Tender package for the procurement of Collection Bank and Independent Agent</li> <li>Establishment of the Collection Account Committee</li> <li>Approve the roadmap score card</li> </ul>	
7.1.9.Steering Committee	) Coordination of the emergency recovery plan for the electricity sector	
7.1.10. Electricity and Water Regulatory Commission (EWRC)	<ul> <li>EWRC strategic plan and budget forecast</li> <li>Amendment of the financial section of EDSA Licence by EWRC</li> <li>Develop off-grid regulation / mini-grid regulation</li> <li>Conditions and modalities for the application, award and repeal of accreditation for the exercise of other activities in the electricity sector</li> <li>Technical criteria for Licences for generation, transmission, dispatch, import, export, distribution, captive load supply, on grid sale of electricity, off grid sale of electricity and the provision of related services</li> <li>EWRC to fast track an interim grid code and set-up a consultative process for establishing the grid code of Sierra Leone</li> <li>Rules and principles for tariff setting</li> <li>Procedures for determining and revising tariffs for the sale and purchase of electricity, for grid access and for the transit of electricity</li> <li>Complementary regulatory regimes to Licence below a minimum capacity threshold; authorisation, declaration and freedom</li> </ul>	
7.1.11. Ministry of Finance and Economic Development (MoFED)	<ul> <li>Designation of the Collection Bank (jointly with MOE)</li> <li>Designation of the Independent Agent managing the Collection Account (jointly with MOE)</li> <li>MoFED to perceive a tax for the use of Bumbuna dam (as a result of repayment of concessional and top-up debt from State budget and not from the accrued value of generation output of the dam)</li> <li>Creation of a collection account for fines resulting from the violation of the provisions of the Electricity Act and false declarations</li> <li>MoFED to set-up financing instrument for paying bill arrears by public institutions (Ministries, hospitals, schools, military facilities, national printing house)</li> <li>MoFED to grant short term loan for financing IPP payment (EDSA) and Fuel payment (EGTC)</li> <li>MoFED to grant medium term loan for financing short payback technical loss reduction programme (EDSA and EGTC)</li> <li>MoFED to grant long term loan for financing procurement of long lead time spare parts and for rehabilitating workshops</li> <li>MoFED to grant long term loan for financing outstanding debt to EGTC and Addax (EDSA)</li> <li>Decision on the creation of a Rural Electrification Fund for co-financing priority projects (electricity Access, Renewable Energy, Energy Efficiency)</li> <li>Tax relief on Heavy fuel oil for licensed generators and solar PV products</li> </ul>	
7.1.12. Local Councils	<ul> <li>Planning of local public service off-grid electricity supply</li> <li>Contracting authority for concession or other Public Private Partnership contracts under the oversight of Ministry of Energy</li> <li>Building the capacity of Local Councils to adequately exercise both functions of planning local electricity supply services and being a</li> </ul>	

Lead stakeholder	Actions		
	contracting authority for concessioning the operation, maintenance and		
	expansion of local electricity services from publicly owned assets		
	Ratification of 128 MW Western Area Generation Project (phase 1: 57 MW)		
7.1.13. Parliament	1st Amendment of Electricity Act		
	<ul> <li>authorisation of Collection Account</li> </ul>		
	<ul> <li>conditions for transferring distributed assets of EGTC (isolated generators) and of EDSA (isolated distribution grids) to local authorities for them to organise the local electricity distribution service</li> <li>inflation adjustment of fines (to keep them deterrent)</li> <li>authorisation of Eligible Customers in restrictive conditions</li> </ul>		

# 7.2. Other actions

Lead stakeholder	Actions
7.2.1.Parliament	<ul> <li>2nd Amendment of Electricity Act         <ul> <li>Legal unbundling of EGTC in EGC and ETC</li> <li>Enable Eligible Customers to set-up bilateral contracts as exception to single buyer market model</li> </ul> </li> <li>3rd Amendment of electricity Act         <ul> <li>Enable partial privatisation of EDSA, EGT and ETC</li> </ul> </li> <li>New Electricity Act replacing the single buyer market model with a decentralised market model</li> </ul>
7.2.2.Ministry of Energy (MoE)	<ul> <li>Commission a second phase of the Electricity Network Investment plan</li> <li>Commission an off grid rural electrification master plan study</li> <li>Conditions for devolving central powers to local councils for organising off grid electricity local supply</li> <li>Decision on the Voltage threshold between transmission and distribution grid</li> <li>Decision on the Woltage threshold between transmission and distribution grid</li> <li>Decision on the manner in which electricity shall be measured and the standards of measurement which shall be employed and the manner in which electricity is permitted to be, or is prohibited from being used</li> <li>Decision on qualifications to be possessed by persons, before they may be entrusted with the construction, erection, repair or alteration of any installation or apparatus or with the charge of any installation or the control of the operation of apparatus</li> <li>Decision on the nature of the tests to be employed for ascertaining whether persons possess the qualifications prescribed by paragraph (d), the form and period of validity of certificates to be issued to persons found to possess the said qualifications and the fees to be paid for such test and certificates</li> <li>Decision on measures to be taken and the fittings to be supplied and used in connection with installation in order to secure public and private safety</li> <li>Decision on determining and publishing norms and standards for the electricity sector accepted in Sierra Leone</li> <li>Definition of the functions of a Transmission System Operator</li> <li>Energy efficiency policy instruments</li> <li>Adoption of an integrated resource plan for the electricity sector including the view of local authorities for the development of local electricity supply services and using the results of a willingness-to-pay survey</li> <li>Decision on the creation of an Energy Management Fund</li> <li>Renewable energy atlas with potential renewable energy</li></ul>
7.2.3.Ministry of Finance and Economic Development (MOFED)	<ul> <li>15 years corporate tax relief on infrastructure projects with development costs exceeding USD20 million</li> <li>Maximum cash injection in the Electricity Sector</li> <li>Maximum national exposure to foreign exchange liability</li> </ul>

Table 16 - List of Actions by Stakeholder

Lead stakeholder	keholder Actions	
7.2.4.Public Private Partnership Unit (PPPU)	<ul> <li>Development of PPA templates</li> <li>Consider support to agreements such as "access to mining resources vs financing electricity infrastructure" as a way to finance electricity infrastructure with local mining resources traded in hard currency. To some extent, the same might be considered with sustainable agricultural and forestry commodities</li> </ul>	
7.2.5.Electricity and Water Regulatory Commission (EWRC)	<ul> <li>J Generation capacity adequacy instruments</li> <li>J Regulatory decision concerning the rules and procedures for fixing electricity tariff to the final consumer, tariff for accessing the transmission and distribution grid, and tariff for generators</li> <li>J Regulatory decision on the procedures for determining and implementing the tariff schedule for the remuneration of operators in charge of the operation of state-owned facilities (pricing model for state owned facilities)</li> <li>J Preparation of a roadmap for integration of the Sierra Leonean Electricity System with the Regional Electricity Market of West Africa</li> <li>J Eliminate price distortions and increase electricity tariff price transparency, including time-of-use pricing and pay-for-services models</li> <li>J Assemble and publish a grid code</li> <li>J Decision on the 1st revision of wheeling tariff that will follow the legal unbundling of ETC and enabling of Eligible Customers</li> <li>J Decision on the 2nd revision of wheeling tariff that will follow the commissioning of the 225kv Bumbuna to Waterloo transmission line</li> <li>J Decision on the 2nd revision of wheeling tariff that will follow the commissioning of the 225kv Bumbuna to Waterloo transmission line</li> </ul>	
7.2.6.Steering Committee	) Coordination of the roadmap implementation plan	
7.2.7.Electricity Generation and Transmission Company (EGTC)	<ul> <li>Obtain a generation and transmission Licence from EWRC</li> <li>Receive finance from MOFED to improve system management and automatic frequency control of thermal power plant</li> <li>Receive long term finance from MOFED to rehabilitate, strengthen and expand the transmission grid</li> <li>Divest some of the isolated generators to local councils to let them organise off-grid local electricity supply services</li> <li>Sign a PPA with EDSA to comply with Electricity Act at the expiration of the collection account</li> <li>Exit the collection account arrangement once EGTC becomes a viable and bankable company</li> <li>Minority privatisation option of EGTC in order to leverage private finance for business growth</li> <li>Preparation for bilateral market arrangement</li> <li>Develop and operationalise the functions of transmission system operator</li> <li>Legal unbundling of generation capacities in partnerships with private investors</li> <li>Develop trading activities to sell to eligible customers and export</li> <li>Owns and operates the generation facilities and transmission facilities that return to public ownership at the expiration of the Licence or concession contract</li> </ul>	
7.2.8.Off-grid Public Utilities	<ul> <li>Sign distribution and/or sale Licence with EWRC</li> <li>Explore new business models to overcome the barrier of high upfront costs of innovative and efficient electricity supply services options</li> </ul>	

Lead stakeholder	Actions
7.2.9.Financial Institutions	<ul> <li>Streamline the financing process for on-grid investment projects, with clear guidelines on documentation requirements</li> <li>Incentivise the co-financing of off grid electricity supply systems after assessing the risks and benefits of this approach</li> </ul>
7.2.10. Non- Government organisation	<ul> <li>Implement consumer awareness campaigns to increase utilisation of off grid electricity supply systems and demand-side electricity management systems (e.g. super energy efficient technologies in order to reduce energy consumption and extend the duration of service)</li> <li>Work with standard-setting organisations and governments to develop performance-based labelling of off grid energy supply technologies and electric appliances.</li> </ul>

## 8. Roadmap implementation, coordination and adjustment process

Launching the roadmap and putting in place tracking systems are key steps of the roadmap implementation, coordination and adjustment process.

### 8.1. Launching the roadmap

The intended audience of the roadmap (including the population of Sierra Leone) must be made aware that the roadmap has been finalised. The roadmap launch shall include a press release, selective electronic distribution of the roadmap and accompanying materials such as the action plan, and public addresses and presentations by roadmap leaders at meetings and conferences.

Formal, high-profile roadmap launch events with speeches from policy and roadmap leaders shall be accompanied by commitments to action from key decision makers and widespread print, internet and radio/television coverage. The critical outcome is awareness among those responsible for acting upon the list of actions and priorities of the Roadmap.

### 8.2. Begin implementation

The roadmap outlines a set of priorities – Legal amendments, policy advances, regulatory changes and financial commitments – that are needed over a defined time frame to achieve the roadmap's goals. The first stage of implementation is to begin those activities. The funding of change management and capacity building programmes will encourage key stakeholders to address near-term priorities and is a key first step in implementing the roadmap.

The Steering Committee may evolve into the body that oversees and tracks implementation of the roadmap and initiates adjustments to the document as needed. The implementation body of the roadmap policy may be designated as a specific delivery organisation within the Ministry of Energy. The work of the implementation unit will be supported by an embedded adviser funded by MCCU at least during the recovery and transition period of the roadmap.

### 8.3. Monitor progress and adjust the roadmap

The roadmap implementation body tracks the efforts of various stakeholders, gathers results as actions are completed, serves as a centralised source of information about progress and, reports to the Steering Committee.

The roadmap implementation body may conduct analyses and/or solicit independent expert views to understand how progress is evolving. Analyses should include monitoring key energy, economic, social and environmental indicators to assess changes and trends towards or away from roadmap goals.

Tasks shall be assigned to specific stakeholders in the roadmap based on consensus and support obtained during the Roadmap development process. This approach facilitates monitoring, as the actions of the responsible stakeholder can be tracked in a targeted way.

Tracking may be performed at periodic roadmap adjustment workshops, at which experts revisit goals, priorities and time lines to determine what changes should be made, if any. The frequency of adjustment workshops depends on the rate of change being pursued; conducting workshops every three years may be appropriate, although the pace of change may justify more frequent adjustment workshops at least at the beginning of the implementation. Adjustment workshops are essential in order to continue to engage the stakeholders in updating the roadmap as progress is made and more information becomes available. Failing to do so might cause the risk that a 10+ year plan become irrelevant after only a few years.

## 8.4. Manage expectations

While the roadmap outlines the actions that should be taken to achieve specified goals, the entire set of actions may not be implemented because of gaps in the stakeholder group, incomplete information or resource limitations. Only certain priorities may be acted upon while others might be addressed in pieces or ignored. While a legal amendment, policy innovation or regulatory update can lead to faster progress than anticipated, progress may be slower than envisaged in the roadmap. Rather than viewing such delays as failures, the roadmap developers should regard them as reflecting the limitations of long-term planning. Indeed, these limitations are among the most important reasons for regularly adjusting a roadmap to maintain focus on its ultimate goals as situations evolve. The roadmap is a "living process" that continues past the roadmap's initial publication.

### 9. Risk factors and Mitigation Measures

The implementation of the Roadmap could be affected by the following key risks: (i) political and governance, (ii) market and macroeconomic, (iii) operation and fiduciary, (iv) technology, network interface and capacity, and, (v) environmental and social. The levels of these key risks are considered high and substantial and expected to be mitigated to a substantial degree by the operational tools and control mechanisms set-up by the roadmap implementing body and supporting donors and IFIs. The donors and IFIs willingness and ability to bear risk, as a result of their mandate and established control systems, allow themselves to act at the frontier of commercial possibilities and be effective 'demonstrators' with regards to electricity access, sustainable energy and climate resilience financing.

#### Table 17 - Summary Risk Matrix

Risk Category	Rating
1. Political, Governance and stakeholders	High
2. Market and Macroeconomic	High
3. Operation and fiduciary	Substantial
<ol><li>Technology, network interface and Capacity</li></ol>	High
5. Environment and Social	Substantial
OVERALL	High

### 9.1. Political, governance, and stakeholder risks

The Roadmap will be rolled-out in a complex stakeholder environment. While Sierra Leone has experienced political stability over the past 15 years, the country faces major challenges of weak governance and widespread poverty. In this environment, the roles, responsibilities and relationships between the MoE, MOFED, other ministries, and the President's Office are often not clear. In addition, the relationships between the MoE and EDSA and EGTC are particularly complex. The dependence of EDSA and EGTC on the GoSL for subsidies enforces the complex relationships. The expected presidential, parliamentary, mayoral and council elections scheduled for March 2018 brings some level of risk and politicisation of roadmap actions during the electoral campaign and with the new administration. Considering that the increase of tariff may not be possible during the campaign and the first 6 months of the new administration, while the generation of electricity will still be growing at high cost per unit, it is expected that the deficit of the sector will still continue to grow with increased payment defaults risks and dysfunction along the value chain. This risk will be mitigated with the reduction of operating and maintenance costs and the establishment of the Collections Account.

### 9.2. Market and macroeconomic risks

The Roadmap implementation will start in a period of uncertain short and medium term growth prospects. The country's debt sustainability situation is projected to remain within moderate risk of debt distress. The fiscal budget is expected to remain heavily dependent on commitments by development partners. The financial recovery of the sector during the first period of the roadmap will be made on a combination of savings and the reduction of payment arrears between governmental agencies. It will be financed by internal debt and call to private finance through a number of proposed instruments (including outsourcing to the private sector). As a result, it will not be subjected to the Debt Sustainability Framework (DSF), and will therefore not be contributing to the external debt ceiling under the IMF's Debt Limits Policy. However, in the event of a payment default and a draw on the payment guarantee instruments, the amount could be counted against the external debt ceiling. The current weak economic outlook for Sierra Leone combined with the fact that the sector revenue is in SLL while a fraction of investment costs and O&M costs will be denominated in hard currency highlights the sector's exposure to local currency depreciation. Fuel price hikes also constitute a major risk as these costs are transferred to the off-taker and are not yet passed through to the tariff. The risk of foreign exchange and fuel price changes can be mitigated by the establishment of the Collection Account, and the commitment of the Government to manage the trade-off between tariff increase and subsidy injection. Through the commitment of the Government to top-up sector deficit, there will be a strong incentive to adjust the tariff once the maximum amount of subsidy injection allowed by the government is reached. In order to adjust Tariff, a broader tariff methodology would need to be put in place, and the capacity of the EWRC would have to be strengthened. Donors such as the Millennium Challenge Corporation are supporting capacity building of EWRC for tariff setting. Later on, during the delivery period of the Roadmap, an automatic tariff adjustment mechanism shall be implemented as per the Policy Letter. Through such a mechanism, the tariff will be adjusted every quarter based on transparent formulae laid down in regulation. Through such a mechanism, EDSA would pass through currency depreciation and fuel price risks to the consumer for instance. This is the reason why such a reform is only possible when the conditions for low tariff are met. Otherwise, the consumers would be exposed to tariff increases at unaffordable levels.

## 9.3. Operation and fiduciary risks

While there is strong political commitment to the Roadmap, the Roadmap faces high sector risks. The sector is already heavily dependent on GoSL subsidies, and the need for subsidies is likely to grow over time, particularly if urgent measures in the roadmap are delayed. A first set of risks is related to the timely and comprehensive implementation of the measures to address the performance of the power sector, and in particular, the financial sustainability of the Public Utilities (EDSA and EGTC) and the financial sustainability and financial independence of the Regulatory Commission (EWRC). This risk shall be mitigated by the improvement of the performance of both EDSA and EGTC (including the appointment of a management contractor for EDSA), by introduction of a fuel tax exemption for HFO generation, by the establishment of the Collection Account, and the commitment of the Government to top-up sector deficit and/or adjust tariff. As long as EDSA and EGTC are not bankable, these measures shall be combined with financing support by MOFED with a blended source of grant, loan and equity injection possibly with the budget support of donors to enable investments to reduce losses in generation, distribution and sale.

## 9.4. Technology, network interface and capacity risks

Another set of risks is related to the timely implementation of investments to ensure that low cost generation capacity, reserve generation capacity, transmission capacity and interconnection with the regional grid as well as adequate distribution capacity are delivered in time. However, the implementation capacity of EDSA and EGTC is weak despite on-going efforts to increase the capacity of EGTC in Generation (JICA, MCC and Salini Contract) and Transmission (Salini contract) projects as well as EDSA in Distribution and Sale projects (Management contract). There is still a significant risk that planned investments in the network would face differentiated delays posing interface risk with low cost generation capacity built with no evacuation capacity, or transmission built with no generation capacity to feed-in, or cross border interconnection capacity built with no interoperability capacity. In addition to the non-served electricity supported by the consumers, the GOSL or sector Public Utilities could be exposed to capacity charges of newly built and unused facilities awaiting the completion of the missing link.

### 9.5. Climate and disaster risk

The actions and investment in the roadmap are not expected to contribute to increasing climate and disaster risks or be affected by climate risks that Sierra Leone may be prone to. However, the landslides and floods of August 2017 have demonstrated the high risk being faced by the population and the Government. Furthermore with the increased share of low cost renewable generation capacity such as hydro and solar PV, the sector will be more and more exposed to hydrological risk and direct insulation risk. Both risks need to be properly managed by providing sufficient reserve generation capacity. The contribution of Sierra Leone to climate change with net GHG emissions will be negligible. But the impact of climate change should affect Sierra Leone in the long term with raising sea level and extreme weather events such as draughts and floods (with landslide effects) that will require adaptation measures not factored in the time scale of the roadmap.

## **10.1. Collection account**

#### How it works now

EDSA is the sole seller of electricity to final consumers and is responsible for collections on behalf of the electricity sector. The revenue collected by EDSA is redistributed through the value chain by commercial agreements. EDSA should pay the bulk electricity suppliers (EGTC and IPPs) through power purchase agreements (PPA). The balance between revenue and suppliers expenses is EDSA's gross margin that should be sufficient to pay taxes, fees, operation and maintenance expenses as well as repayment of the financing charges resulting from investments and banking operations. In turn, EGTC and IPPs should pay their fuel suppliers from the revenue of the PPA and their gross margin should be sufficient to pay their operation and maintenance, finance expenses and fees. As a result the performance of revenue collection by EDSA impacts the entire value chain.

Currently the expenses of the sector are excessive with regards to operational benchmarks and also reflect the higher cost of a sub-optimal infrastructure compared to an optimal structure of assets that has been planned but not implemented in time. Since the government is reluctant to pass through this operational and structural inefficiencies to the tariff paid by the consumer, the revenue collected by EDSA is insufficient to pay the cost of service.

As a result, EDSA has been reluctant to sign a PPA with EGTC at a non-affordable price. And EGTC has been functioning on a fuel cost pass through formula until a price agreement has been forced in June 2017, at 10 US ct per kWh, below the full cost of service. This price is based on cross subsidisation of thermal plants (around 30 US ct/kWh) by the generation output of Bumbuna I and Goma (180 GWh/y at 2 US ct/kWh) and will constrain the thermal generation output of EGTC at around 80 GWh or 20000 tonnes of fuel oil per year. This is equivalent to a load factor of less than 30% of the available thermal generation capacity of EGTC. Should the thermal generation, the transaction price should be increased or the average load factor of thermal generators will decrease. Should the generation output of Bumbuna I collapse, as currently planned after the commissioning of Bumbuna II, the transaction price should also be increased or the load factor of thermal generators will decrease.

Since neither EDSA, nor EGTC are bankable, they cannot raise bank debt. As a result, the public stakeholders (EDSA, EGTC and also government institutions using electricity) are raising payment arrears in an arbitrary and non-coordinated way which creates major dysfunction in the electricity sector.

In order to safeguard the integrity of the operation of the Electricity Sector, MOFED has implemented an interim collection account where all of EDSA's cash collections from electricity sales are collected (there are still some loopholes). This collection account under the control of EDSA is managed jointly with MOFED in order to coordinate priority payments in the sector.

Attracting private investment is challenging in an unbundled market structure where the retail price is controlled by the Government:

For investors in IPP generation facilities, there is no guarantee that there is adequate evacuation capacity through the EGTC transmission grid and EDSA distribution grid and that EDSA as sole public off-taker will have sufficient revenue to pay for the bulk supply bills as per implementation of the PPA agreement with EDSA.

For private investors in independent distribution facilities, there is no guarantee that there will be adequate generation capacity at affordable price and that the consumer price set by the government will be sufficient to cover the cost of service.

#### How it will work

The interim Collection Account will evolve into a fully fledge Collection Account with the following features

- ) The collegial management of the Collection Account by EDSA and MOFED, will be replaced by a sector wide collection account committee that will better reflects the interest of all participants in the value chain. EGTC shall have a representative in the committee, and there will be a representative for the suppliers. EWRC will also have a representative in the committee.
- ) EGTC will be placed under the collection account for the payment of its eligible expenses as per the priority waterfall and will no longer receive payment as a supplier of EDSA. An exit option of EGTC may be activated at any time provided that a sustainable PPA is signed with EDSA and that this PPA cannot be opposed to the structural reforms of the power sector going forward.
- ) The Sector Wide Budget will be the key instrument available to the Collection Account Committee for authorising payment. The scope of the "Sector Wide Budget" will be restricted to the fraction of the market that includes EDSA and EGTC and where the tariff is controlled by the Government. The other fraction of the market that is not connected to EDSA and EGTC and where the retail tariff is approved by EWRC independently and under the principle of cost recovery may be excluded from the Sector Wide Budget.
- ) Private investment in the electricity sector is subject to verification that there will be sufficient revenue collected in order to repay the financial charges. Private investments are not expected to increase the public charges.
- ) EDSA will lose control of the Collection Account operations for the benefit of an independent Agent.
- ) Payments (authorised by the Collection Account Committee) will be made in accordance with the established cash waterfall for prioritized payment obligations to ensure transparency and predictability in cash flows and subsidy requirements.
  - The highest priority is given to tax and levy requirements in order to contribute to the public budget.
  - The second priority is given to the payment of operation and maintenance expenses of all activities through the value chain, in order to maintain the integrity of the electricity supply service.
  - The third priority is given to the payment of investment charge of private investors (also pari passu of PPP projects).
  - The fourth and last priority is given to the payment of a public investment charge not covered by a guarantee instrument (other than sovereign guarantee).
- ) The Collection Account with the cash waterfall priorities will be approved by Parliament through and addendum to the existing Electricity Act (2011). Any future changes to these arrangements would require Parliamentary approval and a legal opinion.
- ) The GoSL will provide liquidity support to cover any deficit in forecasted payment obligations. The GoSL is preparing an operation manual for the management and operations of the Collection Account.

With such an arrangement, the Government bears the full responsibility of insufficient revenue due to prices set below cost recovery level. The GoSL will therefore manage the trade-off between subsidy injection in the sector and electricity prices. As a result, it is expected that a policy for phasing out the sector deficit will be set in place, through progressive tariff increase, reduction of the cost of the generation mix, increase of the transmission capacity and improved efficiency of distribution and sales.

#### Outcomes

 Finance of the electricity sector is managed collectively by sector stakeholders through a Collection Account Committee

- A waterfall payment priority shall provide transparency in the payment aiming at preserving the operation integrity of the electricity sector and providing security for the private investors
- Through the waterfall payment priority, O&M expenses of generators (EGTC and IPPs) are treated equally; only the financial charge that result from investments are treated with differentiated priority; private investment charges (debt and equity) and commercial finance debt (not guaranteed by the government) will have a higher priority than public finance charge (concessional debt and equity) and any debt covered by a sovereign guarantee.
- The GOSL takes full responsibility for the financial imbalance of the electricity sector (with budget support of Donors, if any)
- The GOSL mitigates the risk for private sector finance

## 10.2. Electrification of large rural towns not connected to the main grid

### How it works now

Large rural towns (over 20000 inhabitants) such as Bo, Kemena, Makeni, Magburaka, Port Loko and Lunsar were once known as "cities of light". They now receive power on a rationing basis due to high cost diesel plants and insufficient generating capacity. While consumers within Western area experience frequent electricity load shedding, the consumers in large rural cities live with rationing of not only electricity supply but also water supply. As a result of improper electricity supply (including voltage surges), commercial and residential properties have been destroyed in some cases by fire. Currently, the public service in those cities are known by the accountants of both EGTC and EDSA as loss making business units.

### How it will work

A concessionaire should be contracted to develop the on-grid electricity supply service in a city where there is insufficient generation capacity and where the existing portfolio of clients is small but with a significant growth potential. This option will include the transfer of the public assets owned by EGTC and EDSA to this concessionaire until the expiration of the concession.

When two cities responding to this criteria are geographically within a small distance (namely, Bo and Kemena, Makeni and Magburaka, Port Loko and Lunsar), the same concession agreement should cover the two cities as well as the sub-transmission line interconnecting those two cities and the customers within reach of this sub-transmission line.

When a city is close to a renewable energy site and to a bulk substation (e.g., Koidu), the concessionaire may use the opportunity to develop the renewable energy site in order to serve the load of the city(ies) and to export the surplus of electricity generation to bankable off-takers (in country or outside the country through the CLSG interconnector) using the transmission network operated by EGTC.

When there is a large customer that currently operates from its high cost embedded generation facility, the concessionaire could co-develop a new generation facility (e.g. hydro site) and source electricity from this facility in order to supply the identified large customer at a lower cost than its current self-generation facility. If the identified customer generates electricity at a lower cost (e.g. a sugar factory) than the generation mix of the concessionaire, then the concessionaire shall be enabled to buy surplus electricity from the identified large customer. Back-up arrangements between the large customer and the concessionaire are also possible.

The operation and development of the electricity service supply on the sites of the district that are provided with mini grids developed by UNOPS with the financial support of DFID, could be allocated to the same concessionaire or a distinct off-grid concessionaire. In the latter case, coordination between the two concessionaires will be necessary to select the least cost supply option for customers in areas where there is
potential overlap between the two service suppliers. The Regulatory Commission will ensure oversight of the effectiveness of this coordination.

## Outcomes

- Reduction of cross-subsidies of EGTC (thermal generator investment, fuel cost, high ratio of staff per installed capacity)
- Reduction of cross-subsidies of EDSA (grid maintenance costs, high ratio of staff per consumer, poor collection rate)
- Efficiency improvement of both EGTC and EDSA
- Improved service delivery to existing customers and connection of new customers at a higher cost than the national tariff but still affordable
- Sustainable electricity supply public service in large rural cities and surroundings
- Sustainable electricity supply to community health centres of the district

# **10.3.** Local electrification of small rural towns far from the grid

#### How it works now

Currently there is no electricity supply public service in the small capital district capital cities as well as community health centres in the same district.

#### How it will work

An off-grid concessionaire should be empowered to develop a mini grid where there is currently no electricity supply public service and the number of potential customers is limited (e.g. small cities). The same off-grid concessionaire would be in charge of taking over the electricity supply service using the mini grids that are being developed by UNOPS with the financial support of DFID and the oversight of the Ministry of Energy. The advantage of selecting a single off-grid concessionaire at district level is the relative proximity to the various mini-grid sites for developing the service and the possibility to adopt a uniform electricity supply tariff in the district under the control of the Regulatory Commission. This option is recommended for the following six districts: Kailahun, Pujehun, Bonthe, Moyamba, Kambia and Koinadugu.

Leadership also needs to come from Local Councils and their public service department. Because recommendations were developed to work together in an integrated and mutually reinforcing way, local council leaders will need to resist the temptation to be selective and avoid addressing electricity services issues in areas that are potentially more challenging and less rewarding in the short term.

The action plan for the Local Councils follows:

- 1. Planning of local public service off-grid electricity supply
- 2. Contracting authority for concession or other Public Private Partnership contracts under the oversight of Ministry of Energy
- 3. Building the capacity of Local Councils to adequately exercise both functions of planning local electricity supply services and being a contracting authority for concessioning the operation, maintenance and expansion of local electricity services from publicly owned assets

#### Outcomes

- Sustainable electricity supply public service in small rural towns and to community health centres
- Planning of local public service off grid electricity supply
- Affordable and non-subsidised tier electricity supply to the population including the poorer citizens on the first step of the energy ladder
- Guaranteed electricity supply for basic needs of the population such as access to water, health, education, communication, secured environment and productive activities

# 10.4. Building the capacity of local private sector

## How it works now

The private sector has become the central focus for the economic development. Three factors account for this trend:

- The widespread economic inefficiencies in public sector-led economic development result from a combination of government ownership, lack of competitive market level playing fields and constrained public finance. This has resulted in high priced, non-scalable and poor-quality services, and a growing need for public subsidization.
- Market liberalization and deregulation have provided new markets to expand economies of scale.
- Rapid technological change has provided the cost effective solutions (equipment and processes) needed to support policy objectives with regard to affordable electricity access.

The weakness of the private sector is due to a variety of factors including macroeconomic constraints, lack of physical infrastructure, underdeveloped financial systems, and a lack of supporting legislation and policies. However, the seemingly disappointing performance of the private sector is the result of a number of issues:

- ) The process of liberalisation of the economy has been slow,
- The sharp fall in public sector investment has contributed to the poor performance of private sector investment, with the deterioration in physical, institutional and social infrastructure deterring private investors.

The above diagnostic yields two principal implications:

- ) The economy need to open more fully to develop strong private sector enterprises that can efficiently take over functions that are currently performed by the public sector and that are able to enter into partnerships with international firms to obtain access to finance and technology. The presence of a strong domestic private sector much more than the availability of short-term financial incentives acts as an important determinant for attracting foreign direct investment.
- ) The development of private sector requires a concerted effort to improve the enabling environment for enterprises, and to build the institutional capacity required for the development and efficient operation of the private sector.

#### Outcomes

- Increased private sector technical capacity to respond to local and sub-regional market opportunities,
- Increased private sector financial capacity and access to affordable finance channelled by local financing institutions
- Enhanced public private interface for effective engagement of the private sector,
- Strengthen national business development centres (BDCs) to improve their performance as effective onestop business centres for the private sector, and
- Strengthened human and institutional capacity of the Private Sector organisations

# **Annex 1: Signatories**

This roadmap was prepared solely for the Millennium Challenge Coordinating Unit (MCCU) for use by the Ministry of Energy following intense consultation with the broader electricity sector of Sierra Leone. The information contained in this roadmap is aimed at accelerating the implementation of a radical electricity sector recovery plan by turning sector policy, legal and institutional framework into concrete actions.

This roadmap is signed by the following on behalf of their respective organisations.

SIGNED on behalf of the <b>Ministry of Energy</b> by <b>Amb. Henry O. Macauley</b> acting under delegated authority:	SIGNED on behalf of <b>the Sierra Leone Electricity</b> <b>and Water Regulatory Commission (SLEWRC)</b> by <b>Dr. Zubairu Kaloko</b> acting under delegated authority:
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SIGNED on behalf of the **Electricity Generation and Transmission Company (EGTC)** by **Dr. George Taylor-Lewis** acting under delegated authority:

SIGNED on behalf of the **Electricity Distribution** and Supply Authority (EDSA) by Dr Kabineh Koroma acting under delegated authority:

WITNESS:

Saidu Conton Sesay Chief of Staff, Office of the President State House, Freetown Republic of Sierra Leone

# Annex 2: Consultation report

Public consultations where conducted on the Roadmap with individuals, groups and organisations from different parts of the electricity sector. We received initial feedback from Stakeholders, and engaged in fine tuning the roadmap. This annex summarises the contributions from the many individuals and organisations that have participated in this consultation process.

## A2.1 The Public Utilities

#### A2.1.1 The Electricity Generation and Transmission Company (EGTC)

Given the current pattern of payments to EGTC by EDSA, which is both irregular, in terms of frequency of settling the invoices submitted, and unpredictable in terms of the amounts paid on invoices submitted, EGTC is constantly constrained in meeting its financial obligations, with little time left for other necessary elements of utility management such as strategic business thinking, forward planning, change management, staff training and capacity development. During the consultation process, the company's senior management team expressed the understanding that its full participation in the Roadmap reform would slightly release pressure on its meagre resources. EGTC is fully prepared to make a firm commitment to the implementation of the Roadmap and expects this commitment to be reciprocated by all other sector organisations and stakeholders.

The following is a summary of EGTC's priority actions and activities for the Roadmap reform:

EGTC by ACT of Parliament, has been established as a National Utility Company. However, the transfer
of asset title deeds has not been completed leaving it in a state of legal and financial uncertainty as no opening
balance sheet for the new company could be prepared without a fixed asset register;

 EGTC should be considered as a power supplier, at par with any other IPP and should operate under a PPA arrangement with EDSA. However, given the current financial situation of EDSA, in the interim EGTC should be treated as any other IPP under the Collection Account arrangements or any other source of funding.

• As the bulk of the electricity supplied to the consumers through EDSA is from the Bumbuna I hydropower plant, EGTC requests adequate compensation for the loss of revenue should it be transferred to the private operator when Bumbuna II is in operation. In the absence of compensation of loss of production and corresponding revenue, EGTC would have to charge a higher tariff for operation of its thermal plants which are generally loss making and especially for straight-run diesel generators (which require a tariff of over 35 USc/kWh). Based on the strict conditions and advantages accorded IPPs, EGTC may eventually become bankrupt and eventually cease to exist. EGTC is financially challenged to operate as required under the Electricity Act 2011.

 EGTC is generally in favour of divesting its decentralised generators to the Local Authorities as envisaged under the Roadmap, but notes that this would, at an absolute minimum require management skills within the new organisation contracted by the local authorities in order to undertake the new responsibilities.

 EGTC should be in position to invoice EDSA and other grid users for ancillary services to the system such as reactive power compensation, etc., and a wheeling charge for the O&M services and associated transmission loss incurred.

With these priorities in mind, the EGTC expressed its commitment to play its full part in the successful implementation of the Roadmap and its Action Plan.

# A2.1.2 The Electricity Distribution and Supply Authority (EDSA)

EDSA came into being just over two years ago following the unbundling in 2015 of the then National Power Authority (NPA), an entity that was no longer viable. The unbundling was to create more efficient separate entities for generation (EGTC) and for distribution (EDSA). EDSA inherited most of the liabilities of NPA and, with very little resources finds itself operating in a very challenging business environment. As a result, EDSA devotes a considerable amount of its management's time, its meagre resources and capacity dealing with the challenges of operating the company on a day-to-day basis. This puts a lot of strain on EDSA in engaging in other essential operational activities aimed at boosting the overall financial, technical and sustainability of the Authority. Although full participation in the Roadmap reform would stretch its meagre resources even further, EDSA did express a number of clear perspectives during the consultation process which are summarised as follows:

 EDSA welcomes the establishment of the Collection Account. It hopes that this initiative enhance transparency in its financial management to create trust among stakeholders and potential investors.

 EDSA notes the need for a Grid Code to be adopted in order to provide rules- based system for new and existing power supplies.

 EDSA raised the need for proper coordination among all utility companies and establishments to reduce damage to its assets and infrastructure.

 EDSA expressed the need for a review of connection charges to reflect the actual cost of connection and network maintenance.

• EDSA will embark on a rigorous asset management exercise.

#### A2.1.3 The Off-grid mini grid developers

#### UNOPS (funded by DFID)

The Rural Renewable Energy Programme (RREP) aims at increasing access to electricity and income in remote rural areas for the next 3 years, is funded by DFID (GBP 33 million) and implemented by UNOPS. In a first phase to be completed by July 2017, the project will fund solar PV electrification of up to 50 community health clinics (6 kW systems) scattered over the territory. Those systems shall be later extended to mini-grids with a capacity of 16 kW - 36 kW. In a second phase starting in 2018, the project will electrify an additional 40 mini-grids (health centres and communities), which sizes vary between 40 and 200 kW and based of private sector co-financing arrangement. For the first 50 sites, the project is entirely financed on grant with no recovery of the capital through tariff. Therefore the tariff will be calculated based on the O&M cost and scheduled replacement of equipment at the end of their technical life. UNOPS is recruiting professional O&M operators and will provide capacity building to the local construction teams. UNOPS did express a number of clear perspectives during the consultation process which are summarised as follows:

• A situation should be avoided where an exclusive mini-grid licensee on a given territory would develop only the sites that will provide a high margin and would ignore the other sites of the territory where the margin would be lower. As a result, the latter site would be deprived of electricity access opportunity because of the exclusive agreement.

• A situation should be avoided where a mini-grid licensee retains an exclusive right of providing electricity access by connection to the mini-grid in the neighbourhood of the mini-grid. This may result in a sub-optimum investment where some categories of customers (namely those at the bottom steps of the energy ladder) could gain access to electricity for the same consumption profile with a lower cost solution (e.g. individual off-grid solution). This may also result in the necessity to subsidise with public fund the connection charge of customers at the bottom of the energy ladder while there is a lower cost electricity access solution that would not require such subsidy.

• The principle of uniform electricity tariff schedule for all mini-grid licensees would be a deterrent to private investors as it would imply a complex collection account arrangement with cross subsidies between various mini-grid licensees.

• However, it is legitimate that the regulator requires that a mini grid licensee designs a uniform tariff by client category over the portfolio of sites for which the mini grid licensee retains the exclusive right to develop mini grid services.

• It is also legitimate that the regulator requires that a mini grid licensee provides street lighting services along the pathway of the distribution lines of the mini-grid. The mini-grid licensee shall receive a guaranteed compensation for this service either from public funds or from a levy on the tariff.

• A mini-grid licensee shall be authorised to implement credit screening methods that will result in accepting or refusing the connection of an applicant. The applicant that is denied connection to the mini grid should be offered an alternative opportunity for electricity access such as using solar home systems.

• The regulator may provide an obligation for a mini-grid licensee to connect designated social loads, which may not be creditworthy and will therefore require a guarantee of payment.

• The operator of the mini-grid should be requested to deposit on an escrow account, the reserve buildup from an agreed percent of electricity bills for replacement of equipment. Disbursement of this escrow account shall be approved by the EWRC.

• The contract of the mini-grid operator may have clause that would incur fines or termination of the contract. The risk incurred by the contractor under such clauses must remain manageable.

## PRESSD-SL (Funded by The EU)

With the Promoting Renewable Energy Services for Social Development project (PRESSD), Welthungerhilfe - WHH (in consortium with Cooperazione Internationale - COOPI, Oxfam IBIS and Energy for Opportunity - ENFO) and the Government of Sierra Leone are paving the way for a new and decentralized approach to supplying power to Sierra Leonean households, businesses and service functions. The Project is present in 6 districts (Bombali, Kambia and Portloko, in the Northern Province, and in Kenema, Kono and Kailahun in the Eastern province). The project has provided:

- 100 charging stations of average 570 W each
- 22 Energy hubs of average 3 kW each (in agricultural business processing centres)
- 3 mini-grids (Gbinti 79 kW; Panguma 64 kW; Segbwema 127 kW)
- 12 schools (average 4.3 kW each), 3 hospitals (20.6 kW each), 7 large clinics (3.8 kW each), 2 small clinics (1.5 kW each)
- 3 solar PV laboratories (3.6 kW each) in 3 technical institutes: Government Technical Institute (GTI) Kissy, Government Technical Institute (GTI) Magburaka and Eastern Polytechnic (EP) of Kenema
- 10,558 pico-PV products (D-Light home lighting systems) for sale through a retailing network

The contractor did express a number of clear perspectives during the consultation process which are summarised as follows:

• There is a current debate between the contractor and MoE over the tariff of the mini-grids; MoE is pushing towards unsustainably low tariff. There is no interference of EWRC in the negotiation.

• The charging stations and retail sale of solar pico products are sustainable businesses.

• The electrification of schools is combined with a charging station to ensure as a revenue stream to support the sustainability of the system.

# BAREFOOT WOMEN SOLAR ENERGY ASSOCIATION OF SIERRA LEONE

Barefoot Women Solar Engineer Association of Sierra Leone (BWSEASL) was created under the Barefoot College initiative of India which empowers women through training and deployment of solar equipment in their rural homes. The Barefoot College initiative has been successfully introduced to the Port Loko district on a relatively small scale. This initiative involves local women who have received dedicated training in India and have then returned home to produce, install and maintain low cost solar home systems and to train other women. The local users pay a monthly fee, related to what they would pay for other fuels and lighting facilities. The achievements include:

- The partial solar electrification of 33 towns/villages in Sierra Leone, totalling up to 2950 Solar PV Systems.
- Sent twelve (12) illiterate women for training under the India Scholarship.
- Presently screening 150 illiterate women for possible training as Solar Engineers in the Barefoot Women Solar Training Centre in Konta Line.
- Construction of two (2) production workshops funded by UNIDO for Micro Enterprises.
- Construction of Barefoot Solar Training Centre, with support from the GoSL and implemented by NaCSA.
- Solar electrification of twelve (12) villages where the twelve (12) Indian trained Barefoot Women originate from (Konta Line, Mayainmibana, Kissy Koya, Makandeh, Maboima, Yoni-Bombali, Romakneh, Robikie, Yoni-Bana, Conakry-Dee, Petifu-Lokomasama and Giema-Dama).
- Solar electrification of Police Stations, Police Posts, houses of worship in rural and urban areas and provinces.
- Repairs of Solar Cold Chains in Port Loko District.
- Training of caretakers for UNIDO Growth Centres in Sierra Leone and Liberia.
- Fifty-nine (59) Rural women already trained as Barefoot Solar Engineers and eighteen (18) REWs established.
- Thirty-five (35) male youth trained as solar technicians by Barefoot Women Solar Engineers and are currently working with the Barefoot Women during installations and maintenance

#### Challenges include:

• Barefoot college is considering to build a solar factory in order to increase the local content of the equipment and reduce the cost of import.

• Barefoot college needs to change its business model in order to build sufficient reserve with their revenue to pay for the replacement of equipment with short average technical life such as batteries (4 years expected average technical life). Considering their customer portfolio this accounts for 384 dry cell.

• Barefoot needs to develop partnership and mobilise funding for activities and staff advance training.

• Barefoot needs to develop supply services targeting Micro Enterprise, Bakery, Solar Modules and Agricultural Farm.

#### A2.2 The institutional organisations

#### A2.2.1 The Water and Electricity Regulatory Commission (EWRC)

EWRC is a nascent organisation in the Electricity Sector of Sierra Leone engaged in the initial phase of its operations. There is little doubt that significant capacity needs to be built in the organisation during the coming years and the team of consultant advisors embedded in the organisation under the MCC programme (Regulatory Strengthening & Tariff Support Project) will play an important role in this essential development. The EWRC is also under-resourced at present with a complement of 11 full time staff and eight part-time Commissioners against an envisaged future staffing level of 30 full time officials. During the consultation process, the EWRC expressed its own clear priorities and provided a perspective of its role in the Roadmap reform process. These can be summarised as follows:

• The financing mechanism for EWRC's operation is not yet in place and needs to be resolved. The EWRC is preparing an Organisation and Development Plan, which includes a budget forecast but at present the question of the means for financing the organisation remains open. The EWRC Action Plan envisages the regulation of the production, supply and use of electricity as an immediate priority action.

• EWRC does not see any inconsistency between the EWRC Act and the 2004 Local Government Act in that Local Authorities will not license new entities operating in rural areas for mini-grid or off-grid activities other than for the normal business approvals required for any commercial companies.

• While EWRC Act states that certain supply activities are outside of the scope of regulatory oversight (for example, local community water projects), the EWRC believes that the supply of electricity services through individual solar home systems is out of the scope of regulation and is left to unregulated private commercial sector.

• EWRC sees the regulation of mini-grids as a high priority. Isolated mini-grids can at some later stage become connected to the main system. EWRC sees concessions and franchises as a crucially important means of extending the grid and network and promoting universal access.

• It should be confirmed by EWRC whether it is legal to sell electricity as part of public supply service by lump-sum monthly payment, in substitution to charge per kWh and the maximum threshold for such billing arrangement.

• An interim grid code should be fast-tracked while EWRC develops a proper consultation process for the grid code of Sierra Leone which will take some times to complete.

• The EWRC is considering to regulate connection fee with a uniform tariff at least for the households.

• The EWRC should set-up a tariff for ancillary services provided by EGTC to the system and charged to the system users (IPP and distribution licensees).

# A2.2.2 The Ministry of Energy (MoE)

The following is a summary of address and comments of the Minister of Energy as part of the consultation workshops:

• The Electricity Sector is facing difficult challenges and needs a comprehensive and integrated approach to resolve the present issues and create a long term and sustainable sector

• Of particular importance is the way that the Roadmap closely articulates not only the inherent problems of the sector, which are generally well known, but more importantly that it provides tailored panaceas for each specific problem area.

• Regarding the Collection Account, any action that concentrates only on EDSA, and would neglect its payments to EGTC would not lead to a lasting solution. The MoE requires a holistic approach to the electricity sector and a Sector Wide Budget and Collection Account that best reflect this approach.

• Emergency power is a particularly acute issue in the dry season but is also a reflection of the dysfunctional way in which the sector has operated to date. Had the original projects in the Energy Sector strategy been implemented as planned, then there would not be the capacity deficit that currently exists. The cost of supplying emergency power is greatly in excess of that originally planned for through the implementation of the approved projects.

• For this reason, the MoE wishes to avoid at all costs any further deviations from plans. This also added to the negative atmosphere contributed to the politicisation of energy in the country, which is too important to be treated as such. Energy is a national and strategic issues and deserves the unity of purpose of all parties and stakeholders.

• The regional interconnector is an important contributor to the comprehensive and integrated solution favoured by the GoSL. While multi-country co-investment had not been common, there is increasing interest in jointly funded projects. There has been a joint Liberia-Sierra Leone HPP project (Mano River – 160 MW) proposed some 15 years ago with a feasibility study prepared. The EU had financed a new scoping study on which an updated feasibility study could be based.

• Sector Wide Budget (SWB) needs not include revenues from private sector off-grid or concessioned isolated grids that would be designed from the outset as financially sustainable.

• Improvements in operational efficiency must be demonstrated in the utilities and this would, to some extent mitigate some part of any perceived requirement for tariff increase. The customers should not be penalised for inefficiencies in the utilities. Tariffs cannot be increased in a simplistic manner without taking these improvements into account.

• The existence, or non-existence, of infrastructure is a key issue that has an impact on all other areas of Government policy. The electricity sector requires continuous and consistent investment in order to maintain

the integrity of that infrastructure. Returning the sector to financial sustainability is an essential step in ensuring that the conditions are met that will expand the electricity sector and maintain its integrity in the future. This will provide the infrastructure that is essential in order to provide a suite of other public policy goals in Sierra Leone.

• The Roadmap must be accompanied by an Action Plan which sets out the tasks, responsibilities, timescale, sequencing and priorities. The Action Plan is crucially important in order to secure the benefits outlined in the Roadmap.

• Attractive business environment for private sector investment should not be underestimated. Private investors can be patient for the right kind of funding to emerge. What is crucially important is the dialogue between national and local Government on the one hand and the private sector on the other. Cherry picking is not in the national interest but nevertheless acceptable margins could be made for the supply of all customers with the right kind of funding and this can be agreed through dialogue. Effective dialogue should solve this problem.

• Technological developments are fast-moving and all developments are to be encouraged in tender procedures. GoSL does not want to be seen as ignoring any potential technology that has the ability to connect certain market segments and citizens.

• 'Culture change' is even more important than new generation. The public sector must develop a modus operandi that enables it to work successfully with the private sector. To date, the only interface between public and private sector is through contractors who are often negatively perceived by civil servants. However, there must be no adversarial relationship between the public and private sectors – this relationship is essentially a collaborative one and private sector investment is a key element to delivering public policy objectives. If culture change is not tackled then the likely results will be continued generation deficit. Culture change, change management must be an integral part of the reform process.

• The role of donors needs to be clarified in the reform process and facilitated with an Action Plan that contain terms of reference for supporting actions.

# A2.3 The Donors

# A2.3.1 The World Bank

The following is a summary of World Bank's comments received on the draft Roadmap:

• Considering the implementation of the GoSL Policy Letter to the WB from June 2016, the World Bank takes note that it is included in the overall policy update; in term of action (i) reduction of system loss is in the list of Action for EDSA (ii) same for the management contractor (iii) exemption of HFO tax is in the list of action of MoFED (iv) automatic tariff adjustment has a priority three since the collection account will play this role (v) the collection account has a priority zero (vi) availability of foreign exchange is part of the collection account and sector wide budget (vii) budgetary support for electricity sector deficit is part of the collection account (viii) acknowledgement of support from international stakeholder will be sought by MOE following intense consultation for the Roadmap.

• The Collection Account is a tool to facilitate the management of revenue and cost, it does not generate any revenue. The fundamentals of the sector is more important in the short term and long term. If there is no credible data and information on how much EDSA is collecting and how much EGTC and EDSA are spending, the collection account will not work. The action to improve EDSA/EGTC's financial and technical performance should be emphasized. This includes clear asset delineation between the two, power purchase agreement based on commercial principles, metering and billing infrastructure, financial statements in line with international accounting standards.

• Transparent competitive procurement process, streamlined, efficient and predictable review and approval process could not be overemphasized.

• If no subsidy is required, only light regulation for off-Grid Licences would be sufficient. If subsidy is required, it would be very complicated. While MOFED is struggling to meet only a small part of the need for the grid electricity supply, the issue is how to share and balance the demand by multiple players at the local levels.

• Generation Capacity Adequacy Regulation may unlikely have any practical relevance in the foreseeable future.

• It is questionable whether Sierra Leone needs or should have any policy to support any particular type of energy and in particular renewable energy. The policy should purely be based on economic principle, but transparent and easy to implement.

• The benefit of a Transmission System Operator is questionable in the foreseeable future. A combined network company for both T&D including system operation might be the best option.

• The opening of the market to eligible customers could facilitate and promote big customers to directly contract with generators, and would leave the utility with mostly residential consumers with low affordability, thus making it impossible for cross-subsidy. This would be the case when the tariff for big consumers are higher than the supply cost. In the current context of Sierra Leone, the open access might facilitate and promote generation capacity development. An industry might develop a bigger capacity than it needs if it could supply to a third party directly. A power plant might become more bankable if it could sign a PPA to supply part of its capacity to a financially viable business or industry such as a hotel.

## A2.3.2 DFID

The following is a summary of DFID's comments received on the draft Roadmap:

• Those who are able to fund the connection fee calculated on the "deep charge" principle should pay and should not be subsidised. Subsidies do have a role to play but they should be 'smart subsidies'.

• Increased efficiency deserves a higher priority as it has the potential to significantly mitigate some of the supply problems experienced by the citizens. Currently with 40% losses there is a large potential for improving supplies through efficiency improvements.

• The price of electricity through off grid supply, calculated on cost recovery principle, could exceed 50 USct per kWh for low consumption consumers that are also the poorest. This should not create emotion as long as the overall service provided by the electricity supply remains affordable, i.e. with a monthly cost around \$5-10 per month.

#### A2.3.3 JICA

The development aid programme of JICA in the electricity sector consists of two components (i) investment grant (\$15 million) and technical cooperation (\$5 million).

Under the investment grant programme, a 33-kilovolt distribution substation has been built at Regent and a 33-kilovolt distribution line has been extended from Regent to the Wilberforce substation. Materials were procured to lay 11-kilovolt electric lines between the Kingtom and Congo Cross substations as well as the Congo Cross and Wilberforce substations. Also, 11-kilovolt distribution line materials and substation transformer equipment were procured. A Diesel Engine Generator (DEG) was built with two sets of 5MW generator in the Kingtom Power station. JICA is also planning to install a third 40 MVA transformer (161 kV / 33 kV) at the Waterloo bulk station.

The technical cooperation programme is formulated for a period of three years. The current technical cooperation programme should end in 2017. A new Technical Cooperation programme will be formulated in 2018 and will jointly concern Sierra Leone and Liberia. As per the requirement of MoE, the new programme will focus on capacity development of selected EGTC staff in a Japanese University through a three year cursus. So far, this programme has concerned one person in 2015, one person in 2016 and three persons in 2017. JICA has also provided technical assistance to elaborate the electricity sector master plan for Western area. JICA is also providing technical assistance through the mobilisation of expertise in order to ensure the maintenance of the Nigata diesel engines at Kingtom Power station.

#### A2.3.4 Power Africa

The following is a summary of Power Africa's comments received on the draft Roadmap:

• Addressing off-grid supply through Solar Home System and mini-grids requires two different approaches

• The concession model(s) adopted to electrify capital cities of rural districts should build on the solutions adopted with UNOPS (funded by DFID) and PRESS-D (funded by the EU) programmes

• The proposed minimum threshold of 500 kW for eligibility to the envisaged Feed-In-Tariff policy will make ineligible most of the power plants associated to mini-grid when caught-up by the main grid. A standardised solution should be proposed for small power plants in the range of 50-100 kW. A bulk supply tariff should be established by the EWRC at the interface of the main grid and the connected mini-grid.

• Direct Financial Support (DFS) for the developers and consumers of electrification solutions should be well defined, sustainable and scalable. Modalities of accessing the DFS should be transparent and not discriminate between on and off-grid customers.

#### A1.3.5 The European Union

The following is a summary of discussion with the EU Delegation:

• The EU delegation is involved in the energy sector through the non-binding joint declaration agreement for reinforced cooperation in the field of Renewable Energy that was signed in New-York on Mai 20, 2015 (signature of DEVCO Commissioner Mimica and Minister of Energy Amb. Henri Macauley)

• As a result of this Joint-Agreement, the EU has mobilised resources from the EU SE4ALL Technical Assistance Facility to support the scoping study of the Mano River Dam and the Investment prospectus following completion of the SE4ALL Action Agenda in 2015.

• The EU Delegation is involved in managing the Promoting Renewable Energy Services for Social Development project (PRESSD) co-funded by the EU Energy Facility and awarded following a worldwide call for project proposals. The overall cost of this project is 7 million Euros co-funded by the EU at 75%.

• Sierra Leone is also eligible to access the various blending financing instruments (e.g., African Investment Facility – AfiF, formerly EU Africa ITF - and ElectriFI) set-up by the EU for the promotion of renewable energy and the promotion of modern and sustainable energy access as part of the EU support to the SE4ALL initiative.

• Sierra Leone is benefitting from finance from the EU Africa Infrastructure Trust Fund (predecessor of AfIF) for three projects:

- O Million direct grant for rural electrification in Sierra Leone from the shield wire of the CLSG interconnector and from the five substations in Sierra Leone. The Lead financier of the Project Financiers Group (PFG) is the AfDB and KfW as co-financier. The total investment cost of the CLSG interconnector amounts to €374,4 Million.
- €2.5 Million direct grant on technical assistance for the Bumbuna phase II project. The total
   investment cost amounts to €379,9 Million. The Lead financier of the Project Financiers Group
   (PFG) is the Private Infrastructure Development Group (PIDG with DFID, IFC and others as
   members) and AfDB as co-financier.
- €12.5 Million upfront subsidy used to reduce the interest rate on the EIB loan to Sierra Leone to meet concessionality requirements in line with the terms of the loans of the other financiers of the project. The total investment cost of the CLSG interconnector amounts to €374,4 Million. The Lead financier of the Project Financiers Group (PFG) is the European Investment Bank (EIB) and AfDB as co-financier.

• Sierra Leone is benefitting indirectly from the Regional Indicative Programme of the 11th European Development Fund (EDF) on two projects:

- The funding of the West Africa Power Pool (WAPP) Information and Coordination Centre (ICC) based in Benin to manage Power system information in fourteen ECOWAS countries.
- The funding of the ECOWAS centre for Renewable Energy and Energy Efficiency (ECREEE) secretariat based in Praia, Cabo Verde that provides support to the fourteen ECOWAS countries to implement the SE4ALL initiative.

• As per the National Indicative Programme of the 11th European Development Fund, Energy is not a focal sector and has not received a budget allocation (contrary to Liberia and Cote d'Ivoire in the Region). However, this situation might change in the short term. In this regard, the roadmap and a clear engagement of the GOSL in the implementation will have a positive influence.

# Annex 3: Action Plan

Implementing the roadmap is the primary focus of the Action Plan. Full scale reform will not occur overnight. Changes to processes and organisational structures will take place over the next two to three years, with full culture change being realised over time.

Since the Roadmap for the Reform of the Electricity Sector was released, a great deal of work has been done to validate its direction and recommendations. Where appropriate, action is already underway:

- ) With the endorsement of the Roadmap by all ministries, departments and agencies involved in the electricity sector, the public utilities have taken the important step of indicating that they will embrace this Action Plan as their business plan for the next three years.
- An extensive planning effort is underway within the public utilities, with tremendous energy being put into translating the Roadmap into actions.
- ) Under the guidance of the Steering Committee, the Consultant has conducted consultations with stakeholders. In addition, initial feedback from within the Public Utilities and institutional organisations of the electricity sector were received.
- Work is also about to start to strengthen the strategic capacity of public utilities as well as institutional organisations in culture change, communications, finance, human resources, and information technology. This will be delivered in part under the MCCU Threshold Programme.
- The Ministry of Energy (MoE) has issued formal requests seeking information about alternative servicedelivery including through independent grids, franchising and off-grid solutions.
- The Public Utilities have initiated discussions with the MoE and negotiations are ongoing with respect to budgets, seeking a common strategy on recommendations that require changes to legislation and regulation.
- Action shall be taken to divest some decentralised assets of EDSA and EGTC to local councils in order to enable them to organise the local electricity supply public service with the support of the private sector under the oversight of the MoE. Furthermore, these divestments will save the centralised public utilities on their annual operating and maintenance budget.

# The Action plan is provided as a separate document that includes in annex Action fiches and Terms of References for accompanying actions.

With this Action Plan, the work of the Roadmap team comes to an end, while the work of the Steering Committee and stakeholders to implement the Action Plan continues. The Steering Committee will discuss the Action Plan and decide on next steps. It will still receive the technical assistance of MCCU. This Action Plan cannot be realized without the support of the staff of public utilities and institutional organisations. They will need commitment, engagement, and support. It is the only way forward.

# Annex 4: Reporting on Progress of the Roadmap

The public and stakeholders of the electricity supply public service want to know that change will happen. They need to know that the results will be as intended. This annex describes a transparent reporting process and accessible reform scorecard that will be a radical departure from anything that has been seen in the past.

The essence of approach in this area is that what gets measured gets changed. Stakeholders need to be able to clearly follow the advance of implementation and determine whether those plans are leading to tangible outcomes and real change. This reporting shall be radically different from anything in the past and readily accessible to everyone.

## A4.1. Monthly reporting to the Steering Committee

Active accountability for reform begins with the Steering Committee for the reform of the Electricity Sector. Overseeing the reform is the Steering Committee's most important priority over the next several years. The Steering Committee will need to support the stakeholders of the electricity sectors with mobilising funding, advocacy, advice, and priority setting. At the same time, it will need to monitor, probe, and challenge where necessary. This commitment is reflected in the decision made on August 31, 2017 to accept the Roadmap.

It is recommended that the stakeholders of the Electricity Sector report on progress monthly to the Steering Committee and share these updates with the public. These reports will be framed by the Roadmap, encompass all reform activities and initiatives underway, and include both outcome and process measures.

Outcome measures will tell whether the intended outcomes of the reform of the electricity sector are being achieved. They will answer questions of fundamental importance, including

- Is the capacity to deliver electricity supply services trusted?
- Has the quality of supply improved? Has the public service electricity supply expanded?
- Is the electricity supply public service developing where it is most needed?
- Do staff members feel they have meaningful opportunities to participate in the change process?
- Do people and staff members believe that the culture of the electricity supply public service is changing?

Process information will include things such as the status of work on individual actions, including analyses completed, actions taken, milestones reached and deliverables. This information will allow the Steering Committee, the public and staff members to measure whether the work is proceeding on time and on budget. Information about ongoing localities and staff member engagement processes will also be included.

#### A4.2. Scorecard

An initial Reform Scorecard is proposed. When fully realised, it will be comprehensive, transparent, accessible to all and an example of culture change in action. In presentation and content, this Scorecard will be profoundly different from any current and past approaches.

It is intended to radically change the conversation between the public, the Steering Committee, and the Electricity Sector by providing the public and staff members at all levels with the information they need to hold the Steering Committee and the Electricity Sector's leadership accountable for change.

It will include comprehensive information about the status of reform – including all key outcome and process measures. Some of the information is not new but has never been made available to the extent and in the ways it is recommended. Other information, such as the status of the Action Plan, will be new. But new or existing, information has never been brought together in this way before. This transparency will be invaluable in strengthening internal accountability and identifying opportunities to enhance performance.

The Scorecard will have three sections:

#### A4.2.1. Reform Outcomes

The information in this first section will allow the public and staff members to assess progress on the outcomes of reform as reflected in the Roadmap. For example, is the electricity supply public service:

- ) Present where it is the most needed?
- ) Embracing partnerships to create a sustainable supply service at locality level?
- Focusing on the complex needs of the people and the economy of Sierra Leone?

It will include scoring of the public service's performance by the public, including measuring confidence in commercial and technical staff on the ground, satisfaction with service levels, perceptions of fulfilment of the basic needs, as well as whether the public service is fulfilling its promise to be accountable, transparent, inclusive, and affordable.

It will also include scoring by staff members on a range of fronts including job satisfaction, adequacy of training and the extent to which staff members believe the public service is fulfilling its promise to be accountable, transparent, inclusive, and affordable.

The public and staff members will be able to connect these ratings to the results of comprehensive employee surveys that are conducted annually by each organisation, as well as the results of surveys of the public and locality councils that are conducted by an independent third party.

#### Culture Change Indicators

This section is also where key measures of culture change will be reported on, based on regular surveys of the public and staff members. Measures related to culture change will include public and staff member perceptions of:

- Trust and confidence in commercial and technical staff on the ground and the public service as a whole.
- The extent of inclusiveness and absence of bias.
- The electricity sector as a collaborative partner who is focused on solutions and outcomes.
- Whether people are developing more familiar relationships with tenants of the electricity supply public service, and if these relationships are contributing to the welfare of the locality.

Measures related to culture change internal to the Electricity Sector will include staff members' perceptions of:

- Whether the hierarchy is supporting, valuing and rewarding innovation.
- Collaboration, inclusiveness, and engagement.
- Empowerment of front-line staff to achieve outcomes.
- The support they receive from supervisors and other leaders.

#### A4.2.2. Service Excellence

This second section will focus on measures of the electricity supply public service's operational excellence. It will include successive levels of detail on key electricity supply metrics such as:

- Rate of offenses to the commercial and technical rules prevailing for electricity supply.
- ) Response times.
- ) Number of priority calls attended to.
- ) Injuries of public related to use of electricity and of staff arising from their duties.
- Properties and equipment damaged by inappropriate electricity supply
- ) Number of people reporting incidents online or by phone.

This performance information will be presented for the entire country and by locality. It will also include key administrative and financial metrics such as:

- ) Operating and capital budget performance and variances.
- ) The results of financial management strategies.
- *)* Human resources information such as staff counts, turnover rates, diversity, absenteeism, retirements, and departures.
- ) Employee awareness and recognition.

#### A4.2.3. Reform Process

This third section will provide the public and staff members with comprehensive, multi-year progress updates on the implementation of the action plan. It will be updated regularly to reflect the status of each project, including timelines, milestones, deliverables and budgets. This information presented will inform the public and staff members about what is been done, what to expect and when, and whether the reform is on-time and on-budget.