



SIERRA LEONE ENERGY POLICY

NOVEMBER 23, 2020

JICA ENERGY POLICY TRAINING

Ministry of ENERGY

Sierra Leone is situated in Western Africa with a total land area of approximately 72,325 sq. km. According to Statistics Sierra Leone (2015), the population is estimated at 7,092,113 million in 2015 Population and Housing Census with a growth rate of 3.3%. The capital city of Freetown is located in the western area of the country and is home to approximately 1.25 million people (~21% of the total population).



SIERRA LEONE ENERGY POLICY

NOVEMBER 23, 2020

Sierra Leone has a tropical climate with hot and humid weather in the rainy season, which usually spans from June to November and a dry season, which typically spans from December to May. The country has an ambient temperature range of 27°C - 35°C and relative humidity varying from an average of 80% in the rainy season to about 50% in the dry season. The country has substantial deposits of mineral resources such as diamonds, rutile, titanium, bauxite, iron ore, gold, and chromium.



ENERGY SECTOR ROUNDTABLE

SEPTEMBER 30, 2019

JICA ENERGY POLICY TRAINING

PRESENTATION

Energy

- Status of Demand and Supply
- Short and Medium Term Plan



Status of Demand and Supply Short and Medium Term Plan



8. Short to Medium Term Plan

- Solutions
- Timeline
- Activities

10. Off Grid

- RREP Map
- Planning
- Priorities

11. Summary

1. Sector Statement

2. Sector Diagram

3. Energy Goals

4. Energy Goals Paths

5. Background

- Generation capacity
- EDSA Consumers
- Baseline Parameters
- Transmission Network

6. Challenges

- Sector Challenges

7. Reform Path

- Roadmap Process
- Revised Roadmap



Sector Statement

Reliable, affordable and accessible power is the cornerstone to the development of our economy.



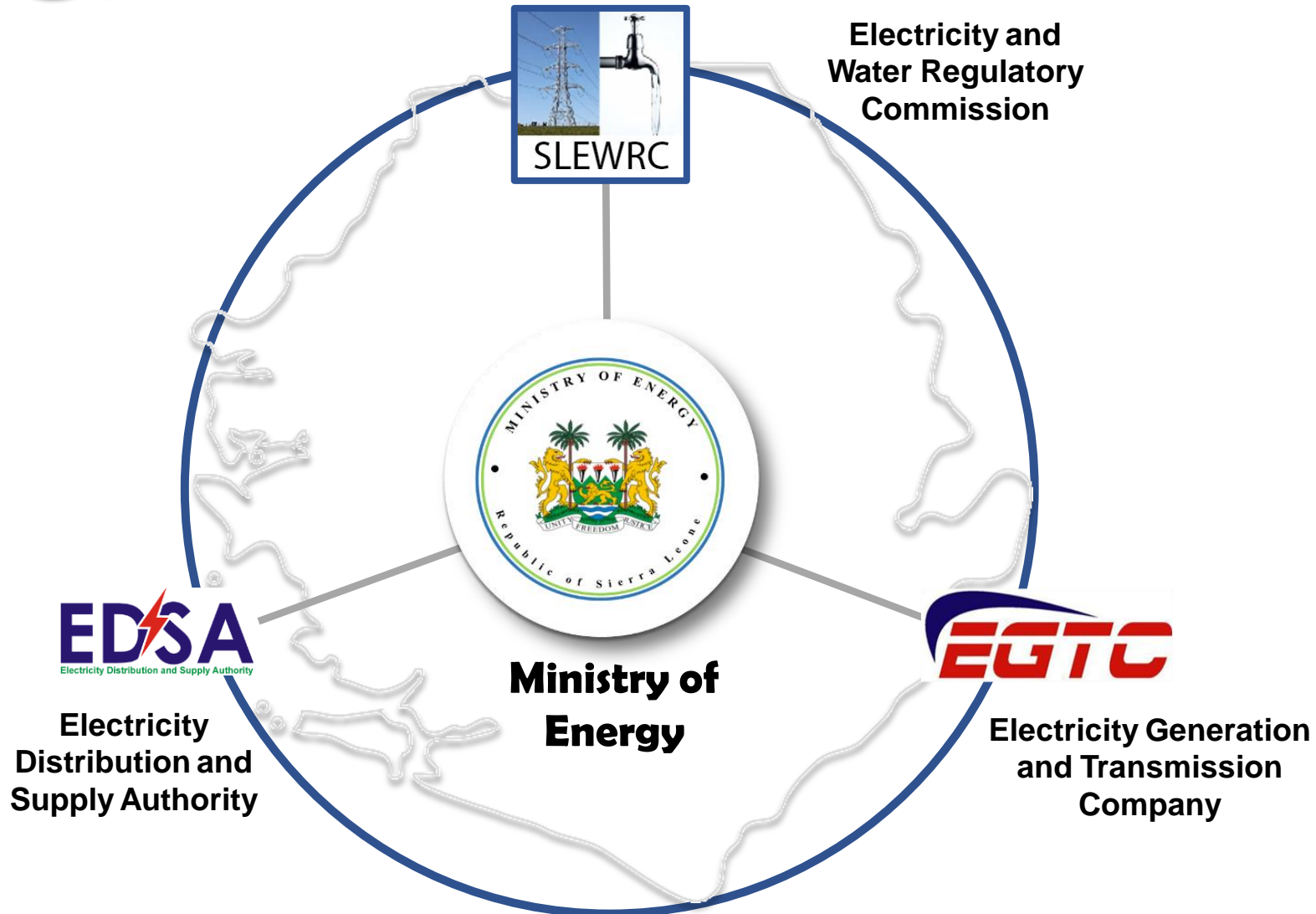
We aim to create an enabling environment for the provision of modern energy services for increased productivity, wealth creation and improved quality of life of all Sierra Leoneans



Our goal to diversify the economy with an expansion in Manufacturing, Agriculture and corollary investment in value-added production, requires the need for electricity in all areas of the country.



Energy Sector Diagram

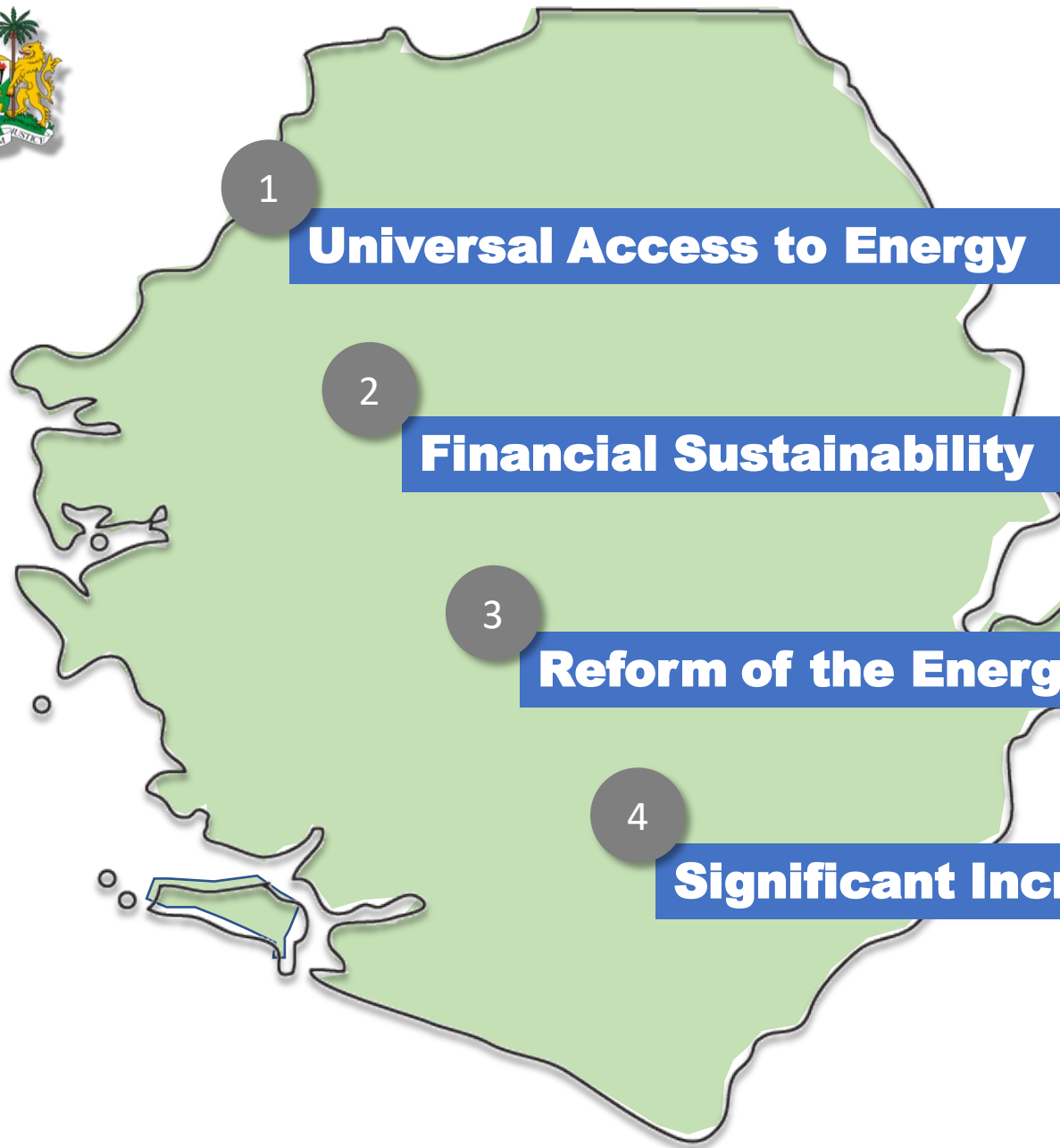


The National Electricity Act 2011 unbundled the vertically integrated utility and created :

The Electricity Generation and Transmission Company, (EGTC) and the Electricity Distribution and Supply Authority, (EDSA).

The sector is monitored by the Ministry of Energy (MoE) and the Electricity and Water Regulatory Commission (EWRC) acts as a regulator.

EGTC is responsible for the generation of electricity and transmission at 66kV and higher, whereas EDSA is responsible for the sub-transmission and the distribution network.



Energy Goals

Our Energy strategy is made up of four dimensions, that we are working to achieve through a defined sector roadmap





GoSL Energy Goal paths



REFORM

- Generation targets through private sector involvement



ACCESS

- Electrification achieved via integrated on-grid/off-grid approach



RENEWABLES

- Additional renewable sources to optimise the energy mix



ACCESS

- Distribution network upgraded, strengthened and expanded



FINANCIAL SUSTAINABILITY

- Pathway toward financial sustainability established



ACCESS

- Integration within West Africa Power Pool imminent

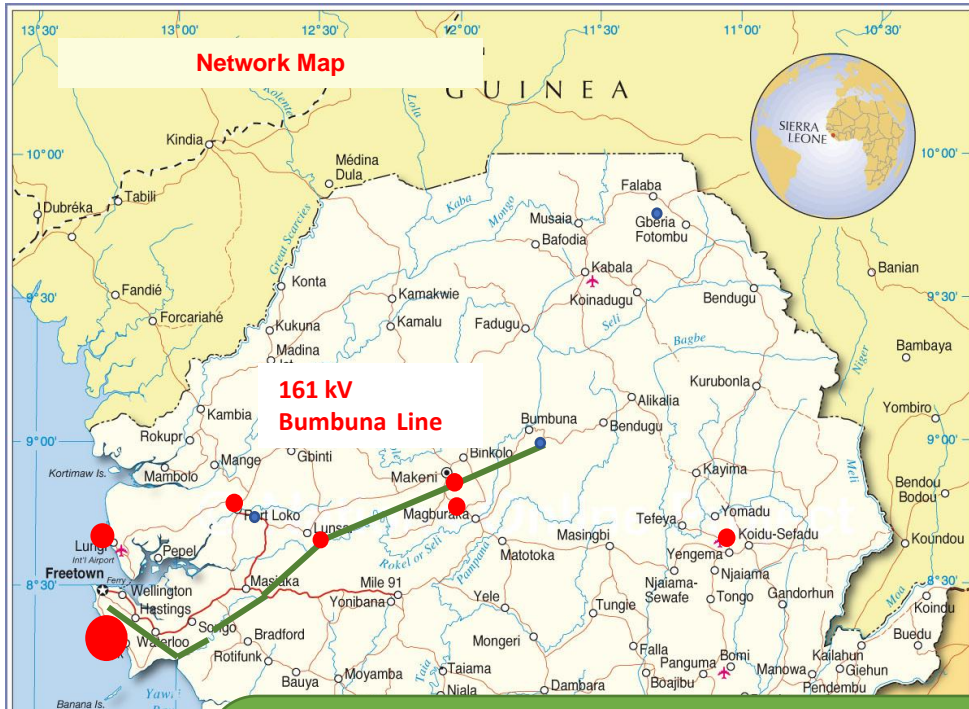
BACKGROUND





Generation Capacity

| Locations | Installed | Available |
|---------------------|---------------|--------------|
| • Freetown (EGTC) | 26.5 MW | 0 MW |
| • Lungi | 6 MW | 2 MW |
| • Kono | 6 MW | 6 MW |
| • Port Loko | 0.4 MW | 0.4 MW |
| • Bo | 6 MW | 2 MW |
| • Makeni | 3.6 MW | 2 MW |
| • Magburaka | 0.8 MW | 0.8 MW |
| • Lunsar | 1 MW | 1 MW |
| • Bumbuna (Hydro) | 50 MW | 40 MW |
| • Kenema (Goma Dam) | 6 MW | 1.5 MW |
| • Karpower | 30 MW | 30 MW |
| • Sunbird (Biomass) | 25 MW | 0 MW |
| • Mini Grids | 6 MW | 6 MW |
| TOTAL | 160 MW | 85 MW |



Western Area Network



Generation Capacity

| Locations | Installed | Available |
|---------------------|--------------|--------------|
| • Freetown (EGTC) | 26.5 MW | 0 MW |
| • Lungi | 6 MW | 2 MW |
| • Kono | 6 MW | 6 MW |
| • Port Loko | 0.4 MW | 0.4 MW |
| • Bo | 6 MW | 2 MW |
| • Makeni | 3.6 MW | 2 MW |
| • Karpower | 30 MW | 30 MW |
| • Sunbird (Biomass) | 25 MW | 0 MW |
| • Mini Grids | 6 MW | 6 MW |
| TOTAL | 160MW | 85 MW |

Key Issues:

- Kingtom and Blackhall not available due to lack of spare parts and poor maintenance;
- CLSG import will come in mid-2020, but no transmission capacity to deliver to Freetown

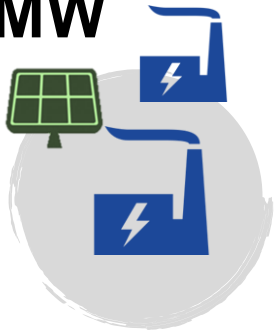


EDSA Consumers

| Region | No. of Customers. |
|--------------|-------------------|
| • Freetown | 143,721 |
| • Lungi | 5,730 |
| • Kono | 3,475 |
| • Bo | 12,714 |
| • Bumbuna | 1,005 |
| • Kenema | 8,961 |
| • Makeni | 14,154 |
| • Lunsar | 1,641 |
| • Magburaka | 739 |
| • GosL | 363 |
| • Diplomatic | 59 |
| • Port Loko | 152 |
| Total | 193,579 |



160MW



Installed Generation capacity

63%



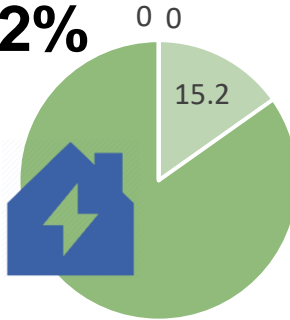
Renewable Generation %

9/16



Number of district capital cities with Electricity supply

15.2%



Proportion of household with access to electricity

202 km



Existing Transmission Lines

60%



EDSA Deficit

Baseline Parameters

45%



Aggregate Technical, Commercial and Collection Losses. (ATC&C)

55kwh



Electricity generated per capita

10



Average hours of unserved electricity/day



Proposed Transmission Network

Existing 161 KV Bumbuna to Freetown

**In Progress 225 KV CLSG
Cote D'Ivoire-Liberia-Sierra Leone -
Completion 2020**

**In Progress Bo-Kenema 33kV –
Completion 2020**

**In Progress 225 kV India Exim Funded
Bumbuna II to Freetown – Completion
2021**

**Proposed 225 kV
Waterloo –Bo –Kailahun - Moyamba –
Lanti-Pujehun
(unfunded)**

CHALLENGES

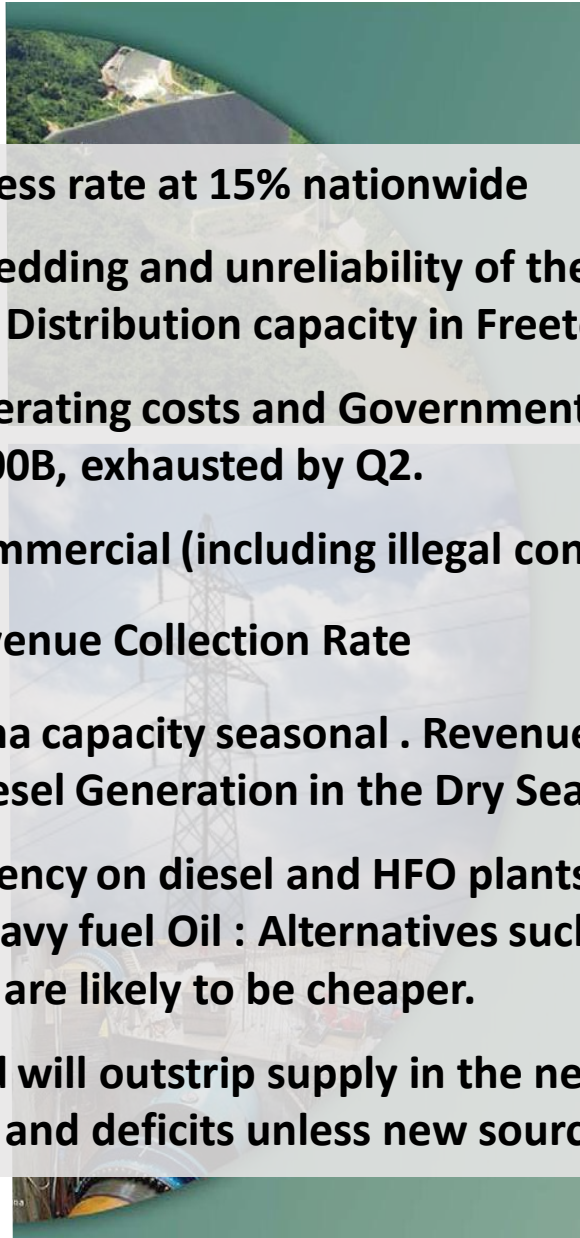
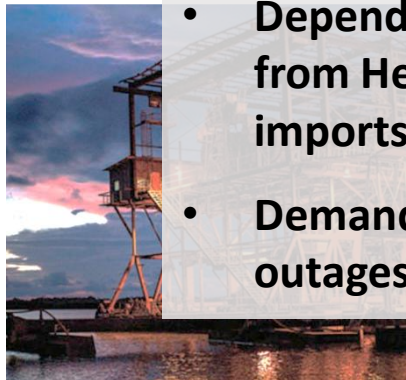
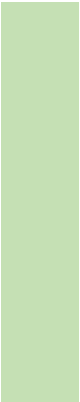




Sector Challenges



- **Low access rate at 15% nationwide**
- **Load Shedding and unreliability of the Transmission & Distribution networks. Primary Distribution capacity in Freetown is 73MW.**
- **High operating costs and Government subsidies. Govt. Subsidies for FY 2019 of Le. 100B, exhausted by Q2.**
- **High commercial (including illegal connections) and technical losses at 40%.**
- **Low Revenue Collection Rate**
- **Bumbuna capacity seasonal . Revenues from low tariff used to pay for costly HFO/Diesel Generation in the Dry Season.**
- **Dependency on diesel and HFO plants. There is a need to transition away from Heavy fuel Oil : Alternatives such as Renewables, Natural Gas or imports are likely to be cheaper.**
- **Demand will outstrip supply in the next 2-3 years and result in power outages and deficits unless new sources of power can be secured.**





High Technical and Commercial Losses in Distribution

| Month (2019) | Electricity Purchased by EDSA (MWH) | Electricity Billed (MWH) | Technical and Commercial Losses (%) |
|-------------------------|-------------------------------------|--------------------------|-------------------------------------|
| January | 42,895 | 27,461 | 35.98 |
| February | 39,970 | 24,837 | 37.86 |
| March | 44,083 | 27,816 | 36.90 |
| April | 45,814 | 28,205 | 38.44 |
| May | 45,337 | 27,238 | 39.92 |
| June | 40,580 | 23,971 | 40.93 |
| Weighted Average | | | 38.3 |



Low Collection Rate and High Collection Losses

| Month (2019) | Billing for postpaid customers | Collection for postpaid customers | Collection rate (%) |
|------------------|--------------------------------|-----------------------------------|---------------------|
| January | 16,510 | 9,429 | 57.11 |
| February | 13,864 | 7,946 | 57.31 |
| March | 16,015 | 6,085 | 38.00 |
| April | 17,105 | 6,956 | 40.67 |
| May | 15,411 | 7,423 | 48.17 |
| June | 13,329 | 9,715 | 72.89 |
| Weighted Average | | | 51.6 |

REFORM PATH

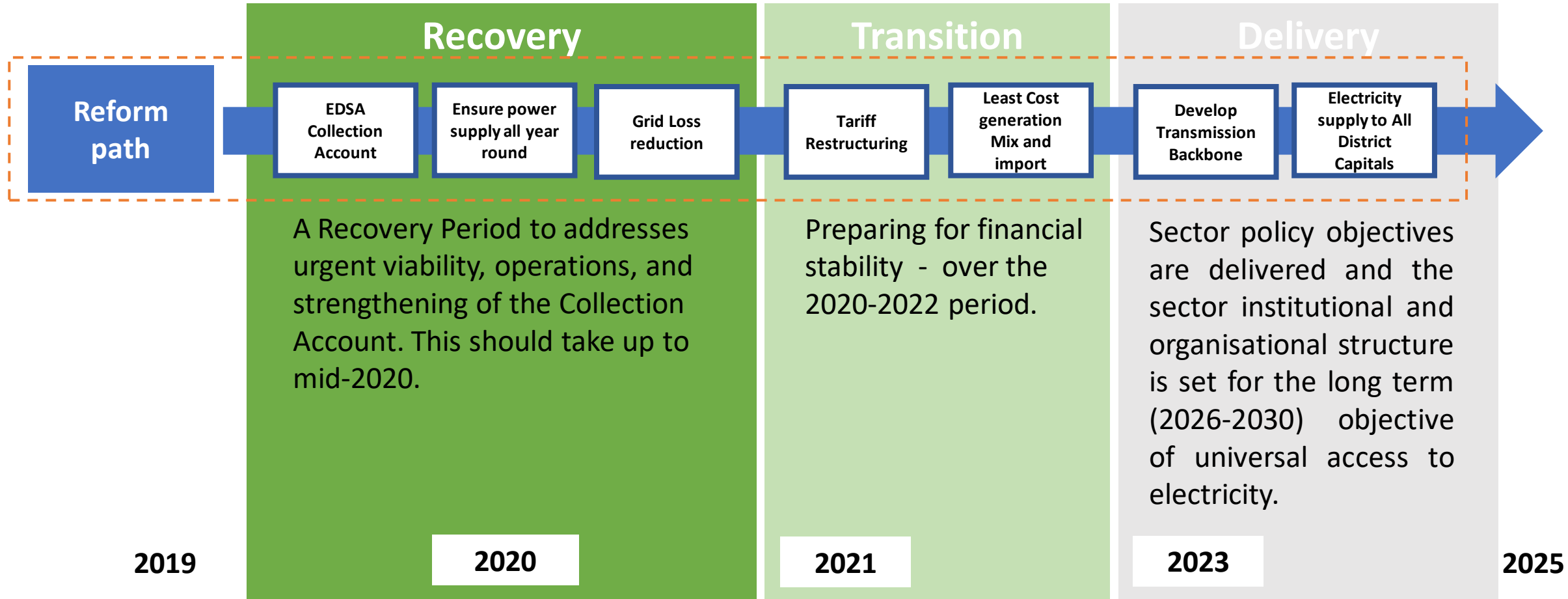


JICA ENERGY POLICY TRAINING



Energy Sector Roadmap to guide Reform and Planning

The Electricity Sector Reform Roadmap defines the pathway to reach the policy objectives set-out by the government, with the required legal and institutional reforms.



SHORT TO MEDIUM TERM PLAN





Solutions

A realistic view has been taken on Generation, Transmission and Distribution options and the time horizon for their delivery:

| Options | | Timing | | | |
|------------|---|----------------------|-------|--------|------|
| | | Immediate (2020- 22) | Short | Medium | Long |
| GENERATION | 1. Karpower - HFO | | | | |
| | 2. Imports/CLSG | | | | |
| | 3. LNG | | | | |
| | 4. Electrification of District HQ Towns | | | | |
| | 5. Rental power - Gas | | | | |
| | 6. Additional Solar | | | | |
| | 7. Permanent Gas plant | | | | |
| | 8. Large Hydro | | | | |
| | 9. Other long term options | | | | |
| T&D | Reduce Comm. and Tech. Loss | | | | |
| | Stability of the system | | | | |
| | T&D for District HQ Towns | | | | |

A. Short to Medium Term

- Transitioning the thermal supply to Gas.
- Reduce Commercial and Technical losses
- Increase stability of the network



B. Long Term

There is a need to undertake a deeper analysis on investment options, many of which require huge capital investment,



Short to Medium Term Plan

- The Government would like to advance these projects on a competitive basis to minimize costs, and maintain pressure on delivery times by:

1. A fast track review and validation of this short / medium term plan.
2. Financing the technical, legal and commercial support needed for Government to bring advance these projects in a competitive manner

Immediate

2020 – 2022 Deliver Newton 6 MW and use rental to match demand and supply

- Minor capacity additions may be required to keep up with demand.
- Delivery of the 6 MW Solar Farm at Newton

2019 – 2021: 3rd Party Grid Loss Verification Program

- An Independent grid loss verification program to enforce action against illegal abstraction.

2019 – 2021: Network Stabilization and Expansion

- New Meters installations and regularization of illegal connections.

2019 Transform all postpaid to prepaid meters

Short

2021 - Incorporate Imports into Generation Mix

- Begin importing around 30 MW of power from Cote D'Ivoire

2022 – Transition rental power to Gas to reduce costs

- Delivery Freetown LNG import facility
- Transition rental thermal to Gas

Deliver Solar Plant to reduce costs:

- Additional solar plants can to reduce overall system costs as identified through IFC assessment

Medium

2024 – deliver Permanent onshore Gas Plant

- Deliver a permanent on shore Gas plant (approx. 60 – 100 MW)

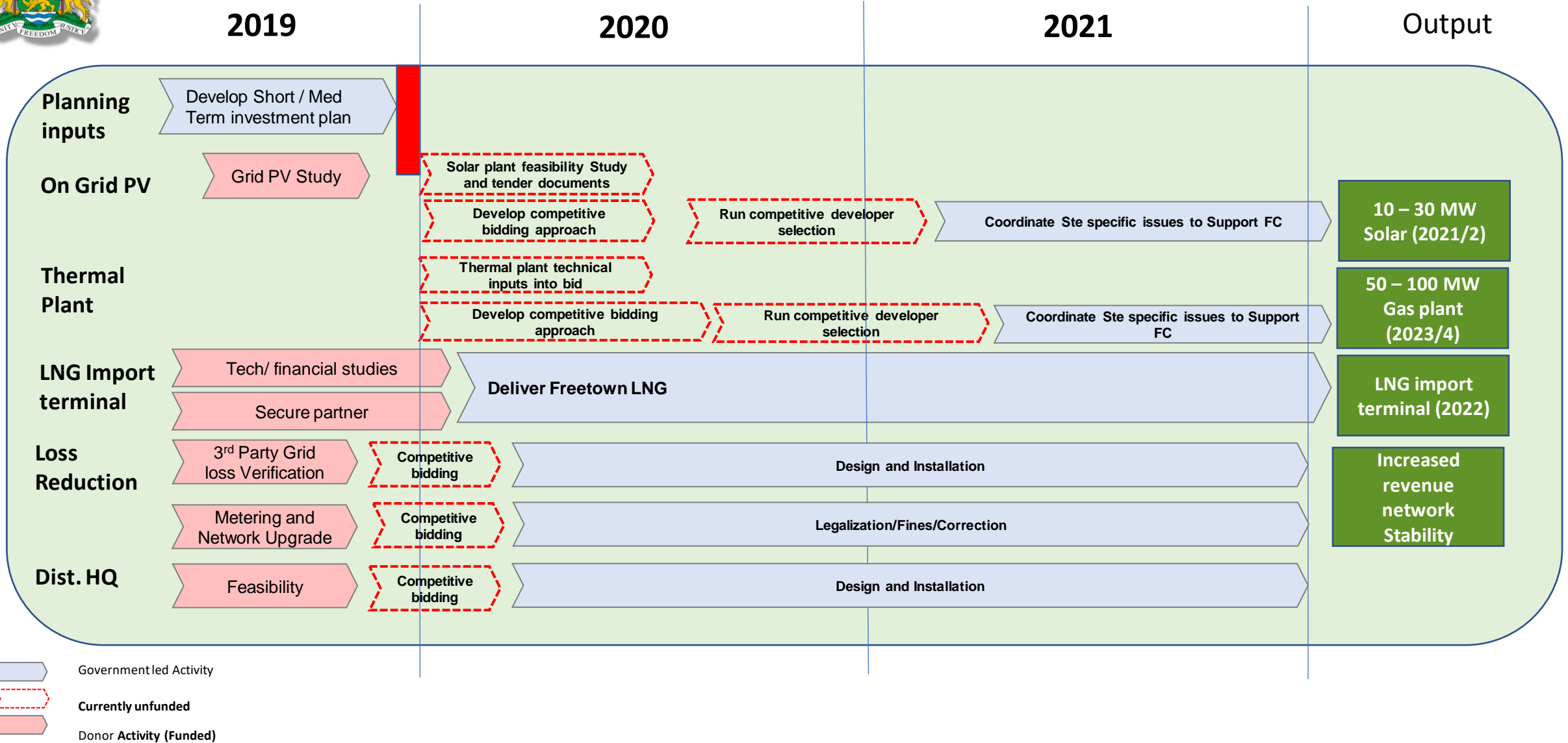
2025

2021

2023



Short Term Activities and Support



OFF GRID ENERGY

JICA ENERGY POLICY TRAINING





Off-Grid Energy Solutions

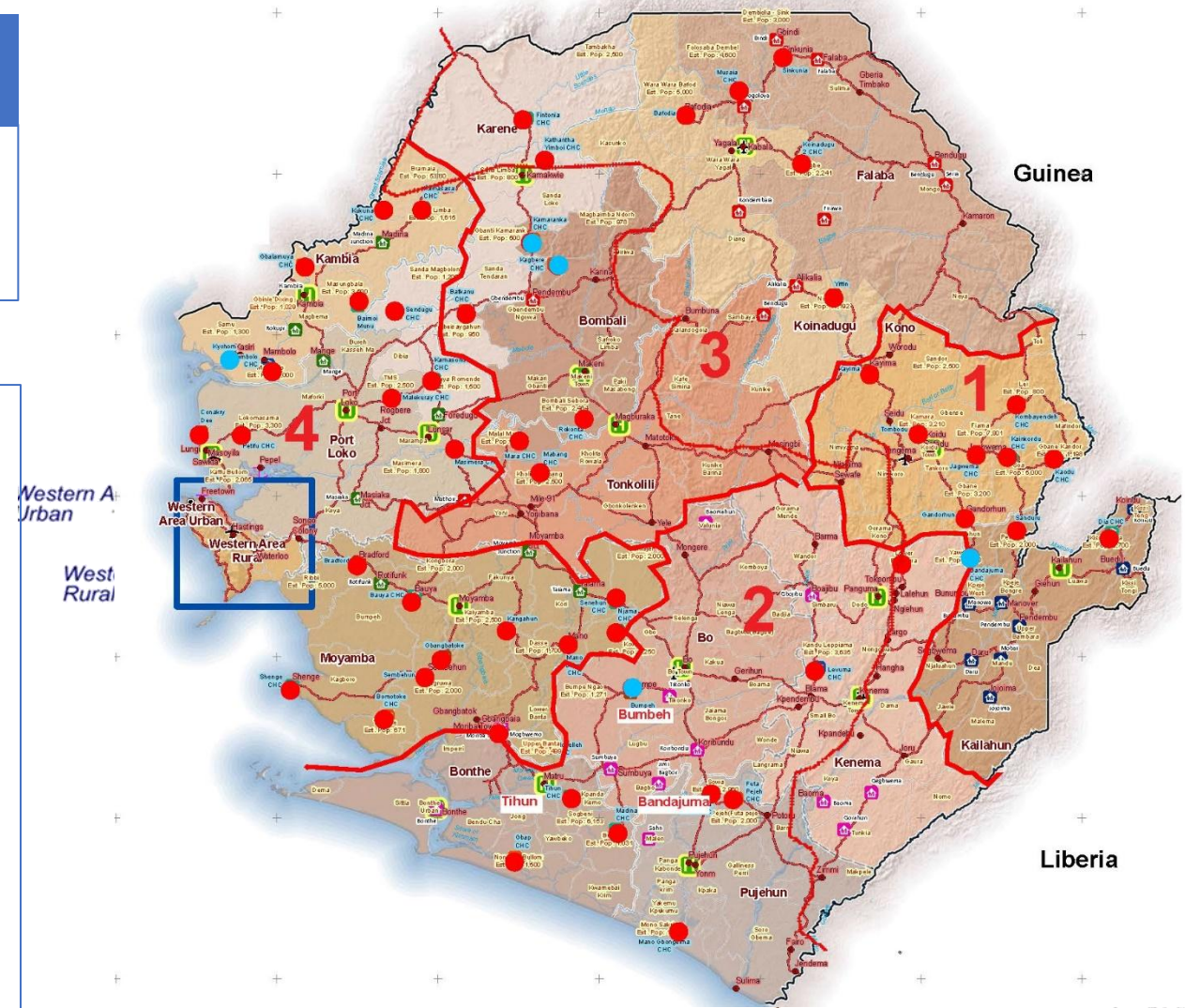
Rural Area Villages

- ➔ Mini-grid and off Grid solutions
- ➔ Solar and Hybrid Generation
- ➔ Pico Hydro

The Rural Renewable Energy Project:

With grant funding from DFID and implementation through UNOPS, government has rolled out one of the most ambitious mini-grid projects in the region.

- ➔ Phase 1 and 2 will see the connection of **94 mini-grid** communities. These are being operated by private concession with incentive for investment and sustainability.
- ➔ Feasibility studies are proposed for further expansion of the project to a total of 154 sites by 2021.
- ➔ USTDA funding feasibility for expansion to **45 Sites**.





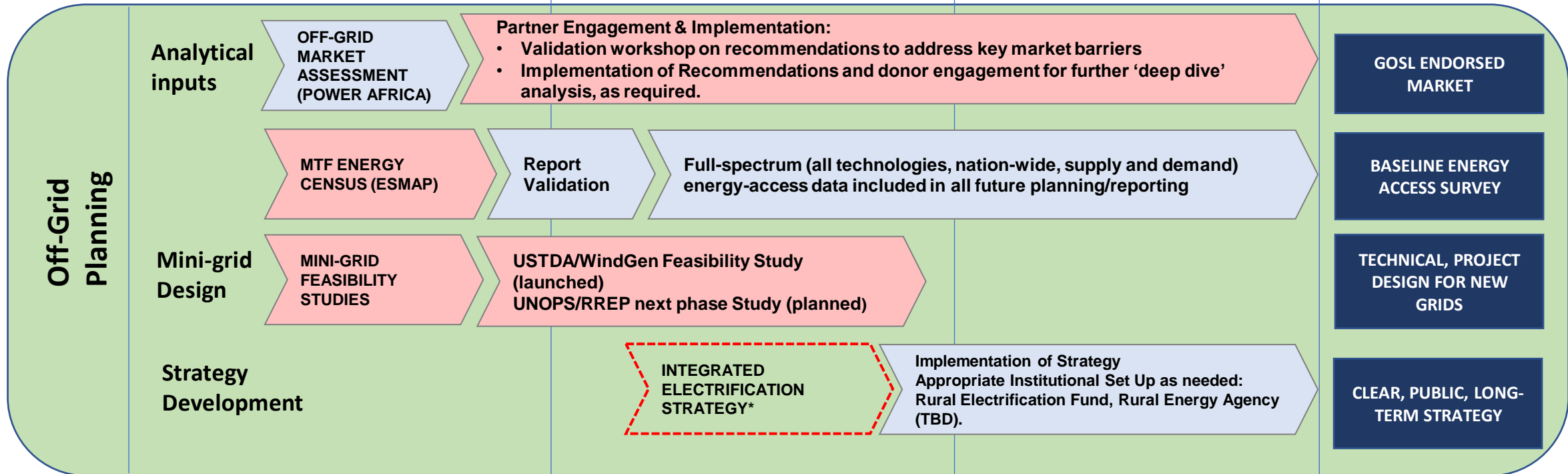
Off-Grid Plan and Priorities

2019

2020

2021...

Outputs



- Government led Activity
- Currently unfunded
- Donor Activity (Funded)

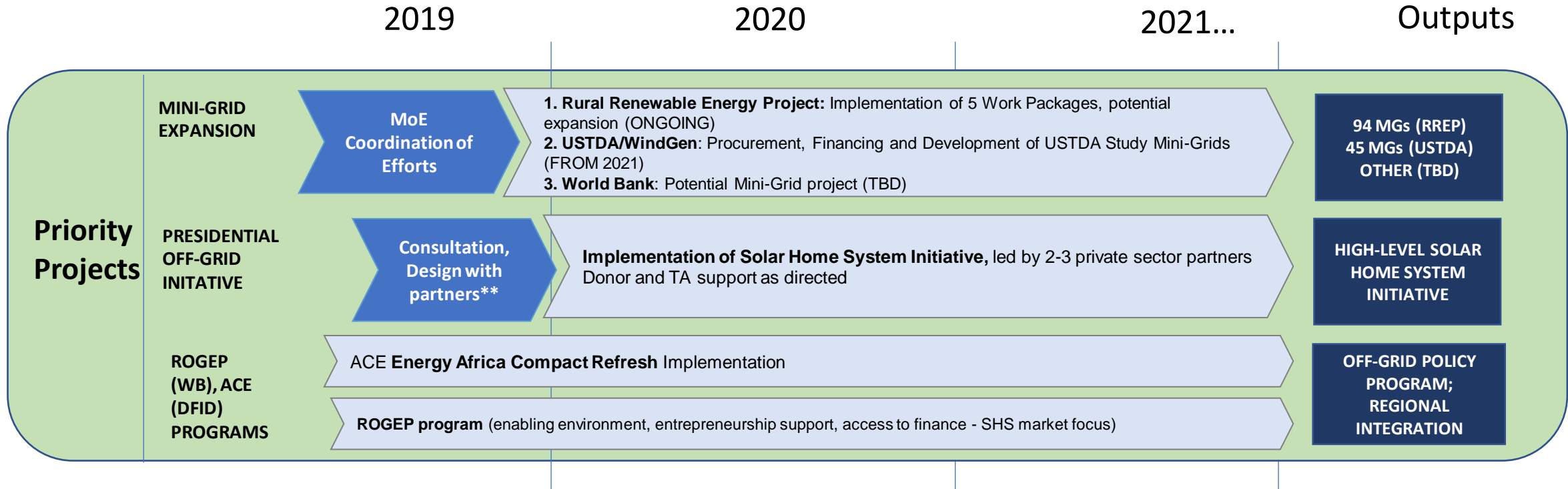
| Study | Potential Funder |
|-------------------------------------|------------------|
| Integrated Electrification Strategy | TBC |

*Integrated Electrification Strategy: clear plan for deployment of grid, mini-grid, off-grid solutions. Based on Least Cost Planning, MTF Survey Results, Market Assessment, Energy Sector Roadmap

** Presidential Initiative: based on experience of other countries – Togo, Rwanda, DRC. Focus on key market barriers and Last Mile Coverage.



Off-Grid Plan and Priorities



- Government led Activity
- Currently unfunded
- Donor Activity (Funded)

| Study | Potential Funder |
|-------------------------------------|------------------|
| Integrated Electrification Strategy | TBC |

***Integrated Electrification Strategy:** clear plan for deployment of grid, mini-grid, off-grid solutions. Based on Least Cost Planning, MTF Survey Results, Market Assessment, Energy Sector Roadmap

**** Presidential Initiative:** based on experience of other countries – Togo, Rwanda, DRC. Focus on key market barriers and Last Mile Coverage.

“To create an enabling environment for the provision of modern energy services for increased productivity, wealth creation and improved quality of life of all Sierra Leoneans”



THANK YOU

JICA ENERGY POLICY TRAINING