GOVERNMENT OF LIBERIA
SREP-LIBERIA INVESTMENT PLAN

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Scaling-Up Renewable Energy Program (SREP)
Sub-Committee Meeting, Washington, DC
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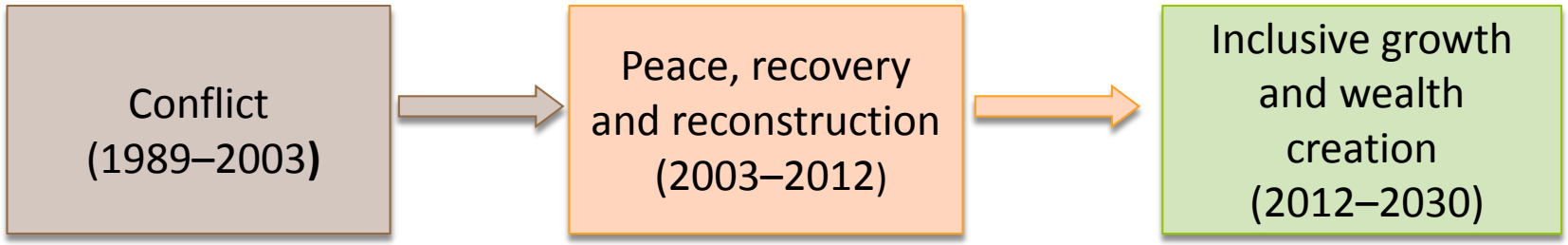
Context

- Population: 4.1 million
- GDP p.c: $374 in 2011.
- Steady growth since the end of the war, however Liberia's recovery remains fragile.
- Poverty remains pervasive, affecting 84% of the population based on the $1.25 a day poverty line.
- The economy remains vulnerable to external shocks owing to limited diversification, commodity price volatility and dependence on imported foods and fuel



Electricity Subsector

- Main institutions in the Electricity Subsector
  - Ministry of Lands, Mines and Energy (MLME)
  - National Utility: Liberia Electricity Corporation (LEC)
  - Rural and Renewable Energy Agency (RREA)

Before the war	Now
• Grid Installed capacity in LEC:191MW (66MW hydro) • Nationwide electrification rate: 7% • Self-supply: 216MW • 11 mini-grids based on diesel: 13MW	• LEC's grid: 23MW (Diesel) • Electrification rate: 1.6% nationwide and 6.7% in Monrovia. • Highest tariff in SSA: > $0.50/kWh.

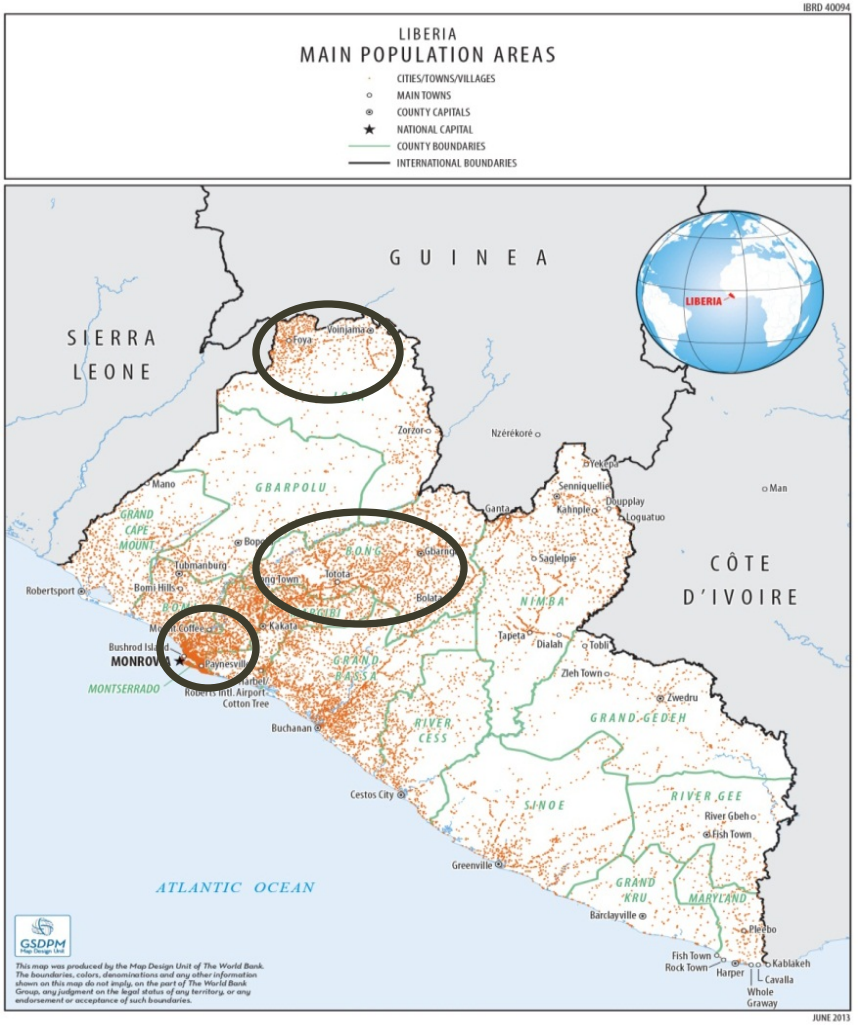
- Currently highly dependent on fuel imports
- Load by 2033 could be of **311MW** and **1,672GWh**. May be exceed du to demand from large customers.
- Electrification rate target by 2030: **70%** in greater Monrovia area and **35%** nationwide.

Current efforts

- Current efforts: provision of electricity by LEC in in Montserrado County (Monrovia, Capital).

- Transformative actions being carried out:
  - Rehabilitation of Mt. Coffee
  - Development of thermal power (38MW HFO)
  - West African Power Pool CLSG Regional Transmission Line)
  - Cross-border connection with Côte d'Ivoire
  - Establishment of RREA
  - Mano River Initiative
  - Pilot scale support for solar lighting and few mini-grids

- But, two thirds of population is outside Monrovia, in remote areas where the grid is not expected to reach in the short/medium-term



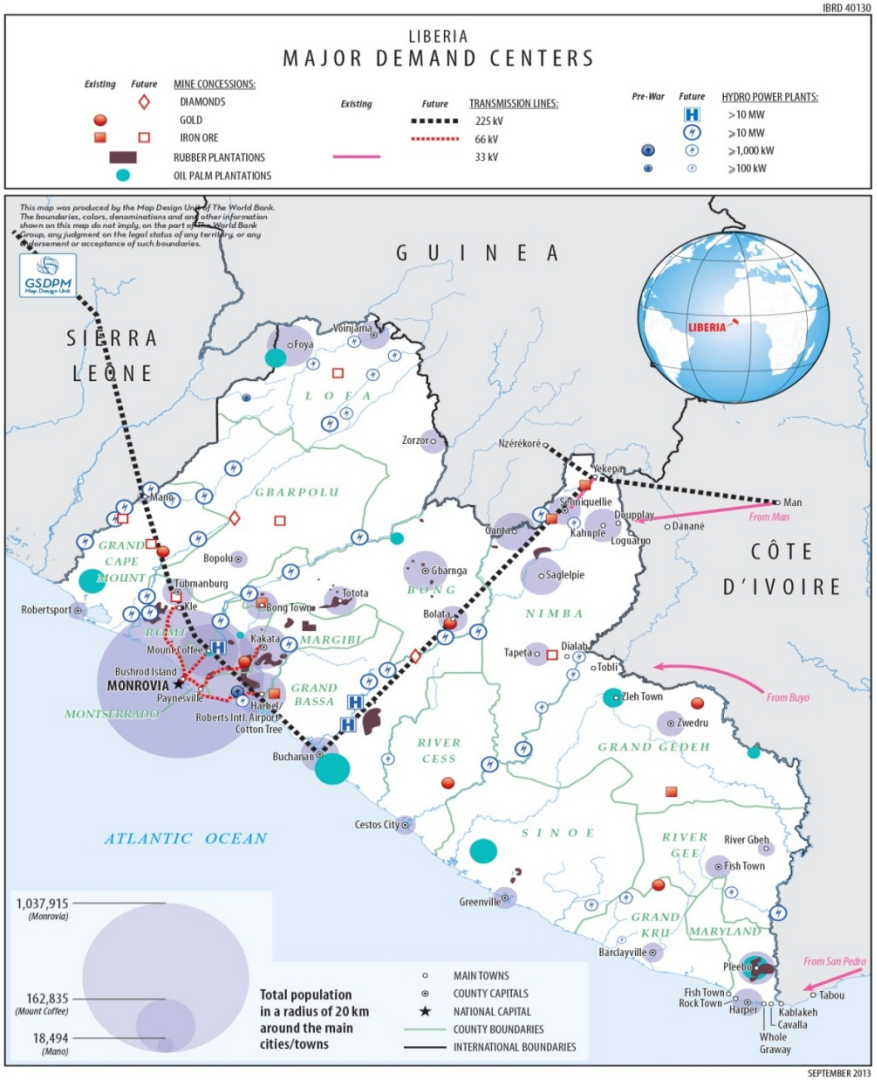
SREP focus and priorities

Results of prioritization based on consultation process and consideration of national and SREP criteria

- Goal: Contribute to achieving 35 percent rural electrification rate by 2030
- Complement expansion of centralized generation and transmission facilities
- Support off-grid electricity solutions - Mini-grids and stand-alone systems
- Renewable energy powered
  - Small hydro
  - Solar
  - Sustainably harvested biomass
  - Hybrids

Off-grid Sites Selection

- National energy and development objectives
- Expansion plan for national grid
- Major demand centers
- Location of renewable energy resources
- Availability and interest of owner/operators



Programmatic Approach

- Rationale for Single Program Approach
  - Cost efficiency and potential for replication
  - Capacity constraints
  - National priority – alignment current national development agenda
- Joint MDBs support
  - AfDB will focus on southeastern region
  - WB will focus the rest of the country

Geographic focus

- Area-based electricity service delivery → facilitates provision of management, operation and maintenance needed to deliver electricity sustainably and cost-effectively over long term.

Renewable mini-grids

Higher load densities (within about 20km of the generation source).

Stand-alone solar PV

Communities with low load densities

Scattered consumers within the service area where mini-grid extension cannot be economically or technically justified

- By concentrating such services in a limited area (e.g. 20 km radius), it reduces O&M and management costs and makes service delivery more efficient

Delivery models

Cooperatives and/or private non-profit entities	LEC ownership	Commercial or public enterprises (anchor customers)	Independent power producers
• Small, isolated mini-grid projects (200 kW and smaller) • Self-generate and supply electricity to the cooperative's members or local population. • E.g.: Yandohun micro-hydro project	• In areas served, or about to be served, by the LEC grid, including the CLSG service corridor and areas serviced by cross-border interconnection.	• Operating existing businesses. • Renewable energy generation project for own requirements and extend services to other consumers nearby. • Electricity as a subsidiary business	• Larger projects • Set up as private companies or joint ownership under PPP (e.g. a private company with LEC) • Generation and sale of electricity to retail customers and eventually to the LEC grid. • Concessions

REEP Components

- ***Task 1. Development of Rules and Regulations.***
  - Standard legal documentation and procedures for licensees and investors, service and safety standards, methodology for tariff setting and customer rights and obligations.

- ***Task 2. Preparation of Electrification Projects.***
  - Preparing prefeasibility studies, bidding documents, financial plans, legal agreements, and approvals, including land acquisition.

- ***Task 3. Mini-grid and Stand-alone Solar PV projects.***
  - It is expected that nine mini-grids and nine stand-alone solar PV projects will be financed to benefit nearly 360,000 people.

- ***Task 4. Promoting Productive Uses of Electricity and Other Technical Assistance.***
  - RREA will also promote productive uses of electricity to raise income generation potential in the community and to increase utilization of available electricity.
  - Activities will include gender disaggregated surveys and consultations to better understand the barriers women face to accessing and participating in the energy services value/production chain.
  - Promotion of potential opportunities for productive uses of these energy services for women.

REEP Financing and Tariff

- RREA with MLME (and LEC) guidance will set service and safety standards, technical specifications, tariff policy and competitively and transparently tender and award projects.
- Tariff setting:
  - Offer affordable tariff structure that is based on consumers ability and willingness to pay. Ensure that poorer consumers can benefit through the use of structured tariffs including life-line rates for the poorest.
  - Electricity revenues and results-based financing must recover all recurrent costs, offer fair returns to developer and services debt
  - Use partial capital investment grant financing to reduce debt and equity to levels that will permit an affordable tariff to be charged.
- Use results based financing, first utilizing Energy+ funds and then sourcing other similar funds and reflows from debt servicing from earlier projects.
- The reflows of debt servicing will go to REFUND to finance subsequent projects.

Financing plan

Two phases approach

Phase I: Rely more on public investment and limited private sector contribution due to the potential risks associated with country conditions and the use of new technologies and untested business models.

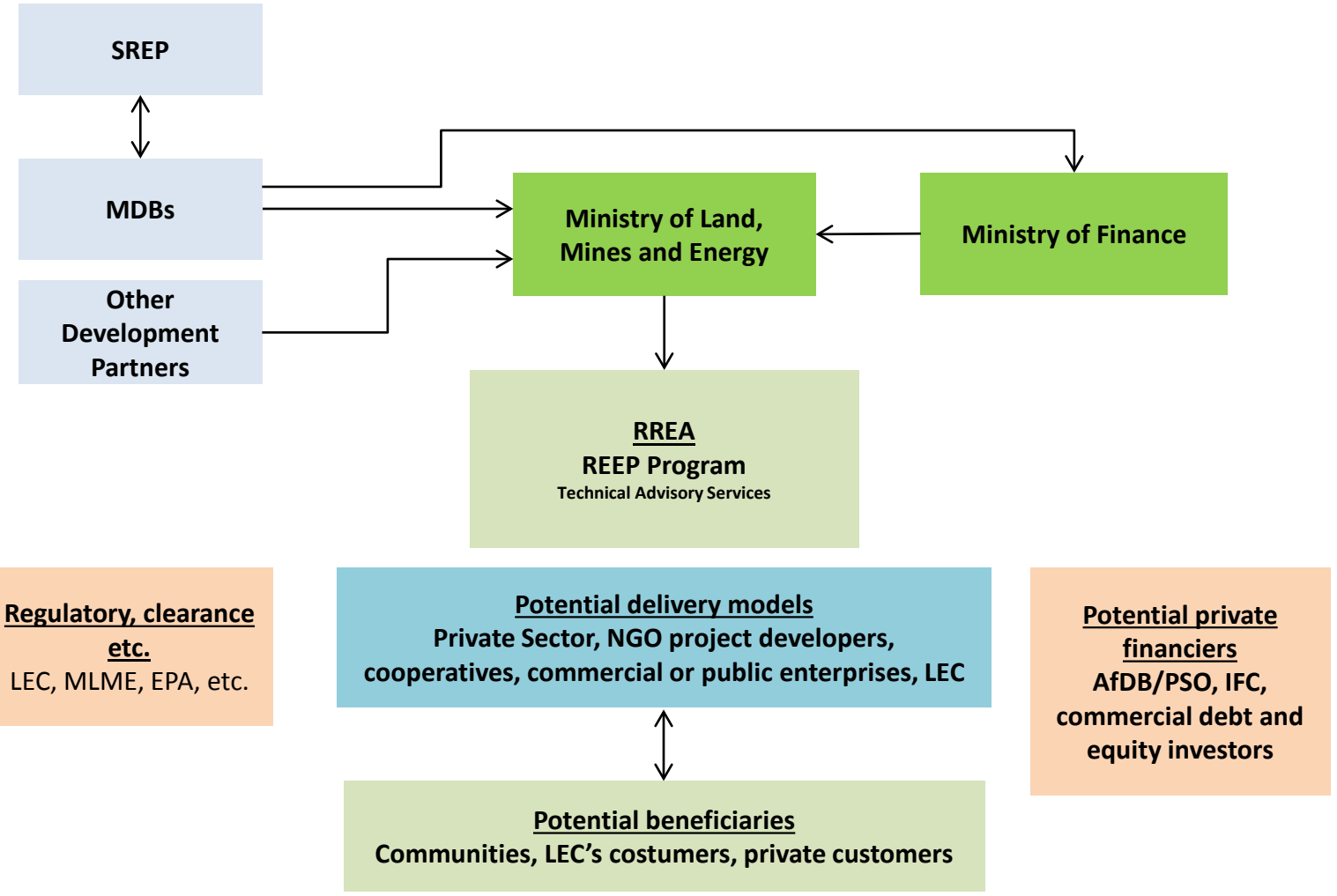
Phase II: Predominantly led by private firms, with development partners' support based on the experience of Phase I

Components	SREP	Total
Phase I	**50.0**	**121.0**
Project Preparation Grant	1.0	1.0
Investment Phase I	46.5	111.5
Investments—Phase I Mini-grids	41.7	101.9
Investments—Phase I Stand-alone PV	4.8	9.6
Technical Assistance	2.5	8.5
Transaction Advisory Services	1.0	2.0
Renewable Resource Assessment	-	0.5
Regulatory/Policy Support	-	1.0
Training & Capacity Building	0.5	1.5
Knowledge Management—M&E	0.5	0.5
Program Management	0.5	3.0
Phase II	**-**	**57.5**
Investments—Phase II Mini-grids	-	50.3
Investments—Phase II Stand-alone PV	-	7.2
Total	**50.0**	**178.5**

Risks and mitigation measures

Main Risks and Constraints	Mitigation Measures
Absence of adequate legal and regulatory framework.	• Regulation-by-contract approaches. • Support the government in presenting to Parliament a comprehensive plan on how renewable energy will contribute to increasing access and striking a balance for service provision between rural and urban areas. • Develop credible and transparent commercial arrangements, to increase attractiveness for the private sector. • Instruments such as guarantees and payment by results can be used and designed based on the conditions of each project.
Lack of access to capital and financing	• A substantial share of the initial capital required for IPRE projects will be grant-based. • Low-cost, low-risk financing through credit lines established for projects will also be used.
High cost of projects	• Reduce projects costs through economies of scale, international best practices, strengthened capacity and lowered risk.
Limited affordability	• Low-cost electricity supply solutions will be developed and income-generating opportunities will be supported. • Recurrent costs for operation and management and fuel will be minimized and fully recovered from consumers. • Supplementary funding such as results-based financing from sources like Energy+ will also be considered.
Limited human and institutional capacity	• Progressive training will be provided, through long-term commitments to ensure knowledge transfer. • International expertise will be tapped to support the development of mini-grid electricity programs. • O&M capacities and business models will be developed and supported.

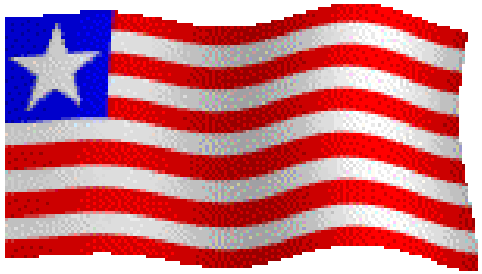
Institutional arrangements



Indicative Program Outcomes

Physical Outcomes	Phase I	Phase II	Program	Comments
Number of projects funded	12	6	18	Number of projects is indicative
Mini-grids	6	3	9	
Stand-alone solar PV	6	3	9	
Renewable energy capacity added	8.8	5.1	13.9	MW
Persons benefiting	240,000	120,000	360,000	
Share of national population benefiting (percent)	6	3	9	
Total electricity supplied	18,542	9,527	28,069	MWh/year
Cost effectiveness (US$/kWh)	0.375	0.359	0.370	US$/kWh versus diesel generation at $0.552/kWh
Diesel potentially offset	8,416	4,323	12,740	m^3/year (assuming diesel is offset)
Value of diesel offset	8.42	4.32	12.74	Millions of US$ per year at US$1/liter
Potential CO_2 emissions avoided	22,500	11,560	34,060	Tons CO_2/year (assuming diesel is displaced)

Source: RREA



THANKS FOR YOUR ATTENTION

QUESTIONS?

Annex 1
Financing Plan

Components	SREP	AfDB[a]	World Bank	NOR Energy+ TA	Other Partners TBD	Private Equity TBD	Govt. of Liberia	Customer Connections	Investment & TA Total	Energy+ Results-based Payment	Other Results-based Financing	Total
Phase I	**50.0**	13.0	10.0	1.5	6.8	12.8	2.5	6.4	103.0	18.0		**121.0**
Project Preparation Grant	**1.0**	-	-	-	-	-	-	-	1.0	-	-	**1.0**
Investment Phase I	**46.5**	12.5	8.5	-	6.8	12.8	-	6.4	93.5	18.0	-	**111.5**
Investments—Phase I Mini-grids	**41.7**	12.5	8.5	-	6.8	12.8	-	1.6	83.9	18.0	-	**101.9**
Investments—Phase I Stand-alone PV	**4.8**	-	-	-	-	-	-	4.8	9.6	-	-	**9.6**
Technical Assistance	**2.5**	0.5	1.5	1.5	-	-	2.5	-	8.5	-	-	**8.5**
Transaction Advisory Services	**1.0**	-	1.0	-	-	-	-	-	2.0	-	-	**2.0**
Renewable Resource Assessment	**-**	-	-	0.5	-	-	-	-	0.5	-	-	**0.5**
Regulatory/Policy Support	**-**	-	0.5	0.5	-	-	-	-	1.0	-	-	**1.0**
Training & Capacity Building	**0.5**	0.5	-	0.5	-	-	-	-	1.5	-	-	**1.5**
Knowledge Management—M&E	**0.5**	-	-	-	-	-	-	-	0.5	-	-	**0.5**
Program Management	**0.5**	-	-	-	-	-	2.5	-	3.0	-	-	**3.0**
Phase II	**-**	-	-	-	32.5	6.1	-	4.4	43.1	-	14.4	**57.5**
Investments—Phase II Mini-grids	**-**	-	-	-	28.9	6.1	-	4.4	35.9	-	14.4	**50.3**
Investments—Phase II Stand-alone PV	**-**	-	-	-	3.6	-	-	3.6	7.2	-	-	**7.2**
Total	**50.0**	**13.0**	**10.0**	**1.5**	**39.3**	**18.9**	**2.5**	**10.8**	**146.1**	**18.0**	**14.4**	**178.5**