

COUNTRY ASSESSMENT REPORT SIERRA LEONE

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1. Country Assessment Report

Country/ Region name: *Sierra Leone*

Located on the west coast of Africa, with a population of 8.2 million, Sierra Leone is a low-income country. In 2020, its adjusted net per capita income was \$484.50 (World Bank Data).

After a devastating civil conflict in the 1990s, Sierra Leone's energy infrastructure was left in tatters. Development had been considerably hindered by the 2014 outbreak of the Ebola virus, and while subsequent governments have made notable progress since the end of the conflict, recent investment has been further constrained by COVID-19. Energy access thus remains significantly below the average for sub-Saharan Africa, with a national grid access rate of around 25%. Urban access is around 45-50%, and rural grid access is around 4.5%. (World Bank, 2020).

1.2 Electricity Generation and Demand: (type, MW, TWh)

Sierra Leone's abundant natural resources and renewable energy potential offer attractive investment opportunities across diverse sectors. Currently, the country's power sector is relatively small, with an installed capacity of slightly over 300 MW as of 2023. Despite these challenges, the country possesses potential for renewable energy, with numerous waterfalls suitable for hydropower projects capable of exceeding 1000 MW, alongside an estimated solar power capacity of over 240 MW. The Government of Sierra Leone (GoSL) has showcased a strong commitment to increasing energy supply through the introduction of the Electricity Sector Reform Roadmap (ESRR) (2017-2030). The GoSL aims to significantly increase installed electricity capacity from 300 MW in 2023 to 850 MW by 2030, to restore electricity supply to all districts and cities. Additionally, GoSL plans to raise the contribution of renewable energy to 80% by 2030, up from 31% in 2022.

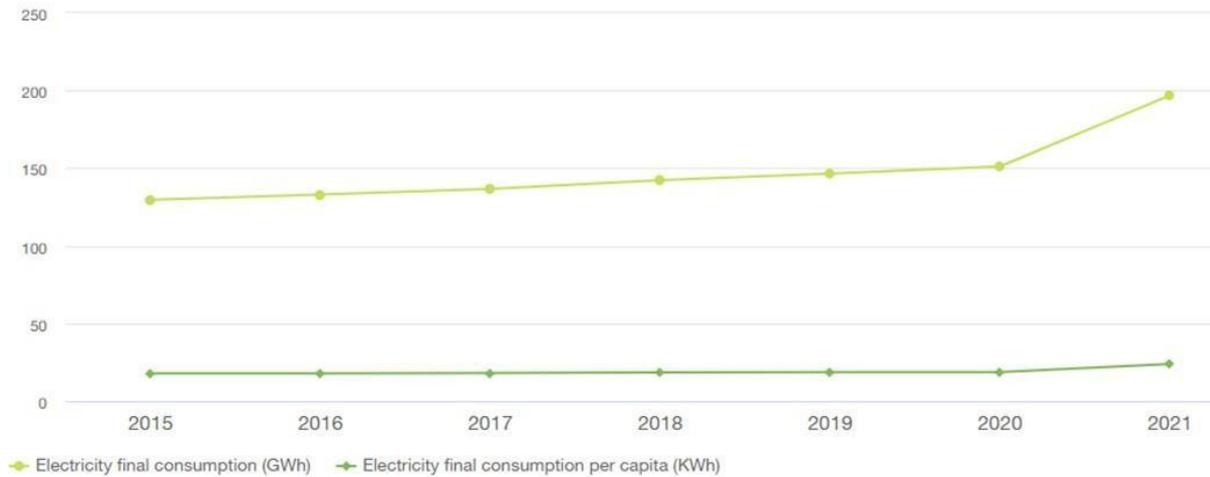
According to IRENA's Renewable Energy Statistics 2023 report, Sierra Leone's total electricity capacity from renewable sources increased from 55 MW in 2013 to 104 MW in 2022. Of this 104 MW, 61 MW came from hydroelectric power, 9 MW from solar power, and 34 MW from bioenergy. An additional 10 MW from the Makoth solar plant and 5 MW from Serengeti Energy's Baoma 1 plant were added in 2023 to increase power supply to the Western area and Bo town, respectively. These actions are significant steps in building a sustainable energy future for the country.

An assessment of the available data indicates that the total generation capacity supplying the grid is 300 MW. The current power sector is relatively small, as the country lacks a reliable public power supply, which results in demand consistently going unmet. Thus, current energy demand is highly dependent on biomass fuels, which account for over 80% of the energy used, due to the popular use of firewood for domestic purposes. Imported petroleum products account for 13% of the remaining energy supply, as the main source of energy for the modern productive energy sector (Ministry of Energy, MoE).

The renewable energy contribution to the grid supply is reported to be between 50% and 80%, with half of the country's electricity generated from hydroelectric sources, according to the Ministry of Energy (MoE). The most significant contributor is the Bumbuna plant, located in the northern province on the Seli River, with a maximum output of around 50 MW. It mainly serves Freetown and the northern capital, Makeni (African Development Fund).

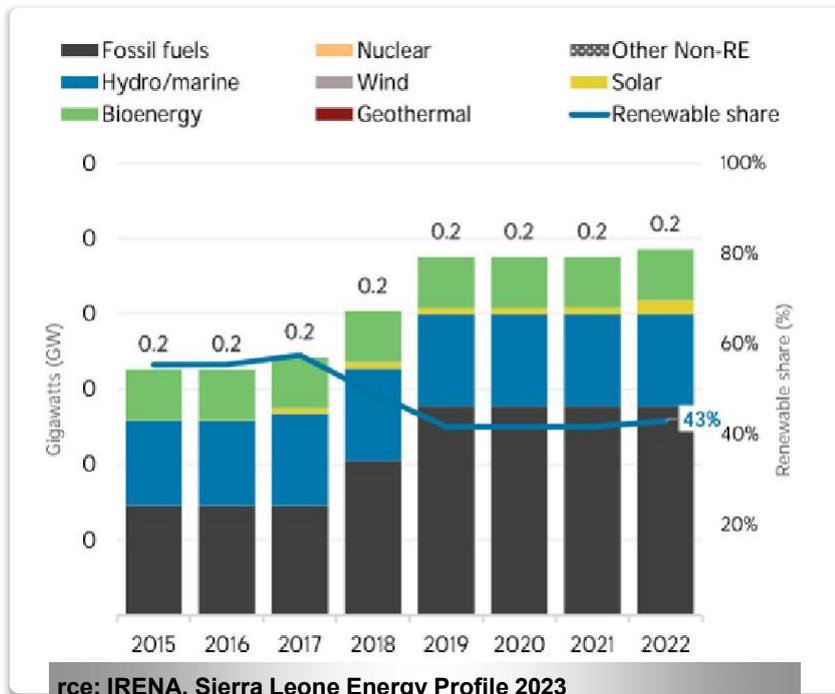
However, the productivity of hydroelectric sources is complicated by the seasonality of West African rainfall, and production drops to as little as 20-25% of capacity during the dry season (Conteh et al, Sustainability).

Final Consumption (GWh)



Source: AFREC Database

Due to this inefficiency, thermal plants are used to stabilize supply and make the second-largest contribution to current generation capacity. These include state-owned generators at KingTom (10MW) and Blackhall Road (16.5MW) in Freetown, along with the privately owned “Karpower” ship-based generator moored in the harbour (50MW), as well as smaller plants in Lungi town (6MW), Bo city (4.8MW), Kono (2MW), and Lunsar (1MW) (World Bank, MoE).



Source: IRENA, Sierra Leone Energy Profile 2023

The total absence of grid-based supply across most of the country has led to a heavy reliance on fossil fuel-powered generators, not only by the state utility and private households but also by larger commercial and industrial consumers, including those in the mining sector. Overall, there are an estimated 35,000 diesel generators of various sizes in operation across the country, contributing an estimated 180 MW or more to the

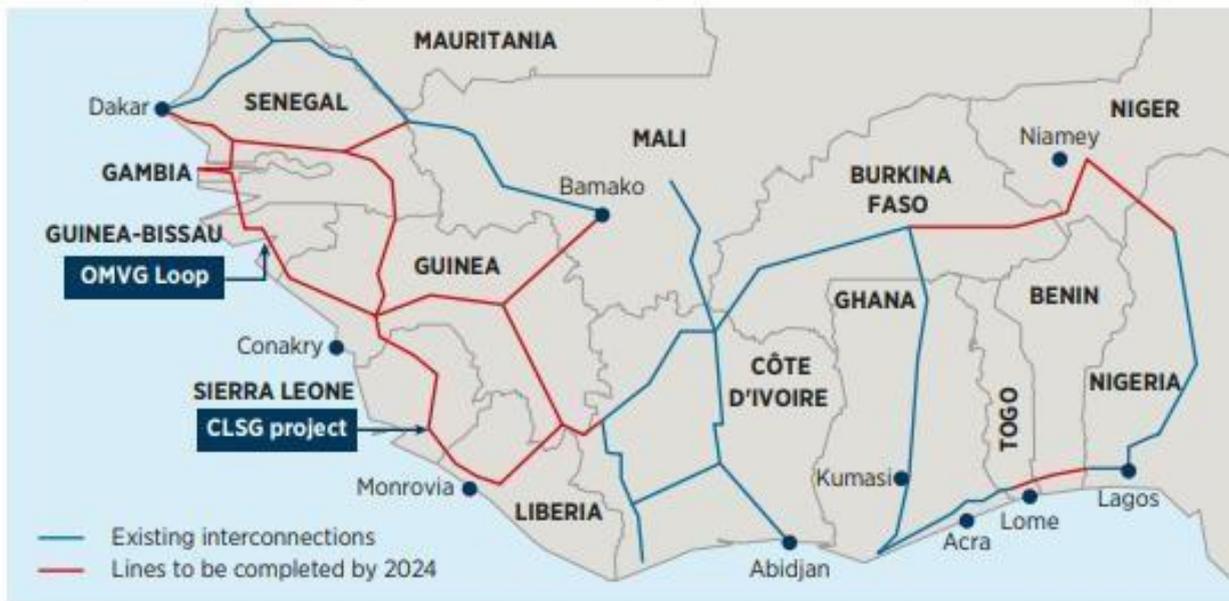
total national generation (UK Department for International Development).

1.3 Electrical interconnection and import/export:

The main grids in the country at present are a) the Freetown and Western Area Peninsular (WAP) grid which serves about 40% of the peninsula’s residents; b) The Makeni Grid, also supplied by the 161kv line from Bumbuna; c) the 33kv line serving both Bo and Kenema; d) the stand-alone grids in Kono and in Lungi (MoE). In addition to the Rural Renewable Energy Project and other projects to develop mini grids for rural communities, particularly the chiefdom headquarters towns, there is also an ongoing project to construct stand-alone grids in other district capitals, including Kailahun, Kabala, Kambia, Bonthe, Moyamba, Matru Jong and Pujehun, though how these will be powered or by whom is not yet fully clear (Parliamentary Budget Office). While there is insufficient grid coverage, the existing grid systems are in considerable disrepair. Weak transmission and distribution systems are insufficient to meet the needs of a growing population, resulting in transmission losses of 35-45%, poor voltage quality, and frequent blackouts due to equipment failures (Conteh et al., Sustainability).

For this reason, GoSL (via the Ministry of Energy and Electricity Distribution and Supply Authority, and with assistance from a range of development partners including Power Africa, the World Bank and Ecowas Centre for Renewable Energy and Energy Efficiency) has been considerably focused on rehabilitating and/or replacing the existing grids, improving the institutional performance of the Electricity Distribution and Supply Authority (EDSA), the national utility, and reducing losses due to the relatively high number of illegal connections.

West Africa's interconnected grid and its near-term expansion



Source: Extract from World Bank (2020b); based on UN Clear Maps.

Disclaimer: This map is provided for illustration purposes only. Boundaries and names shown on this map do not imply the expression of any opinion on the part of IRENA concerning the status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.

In terms of both national and regional connectivity, however, another major initiative likely to have cross-cutting benefits to Sierra Leone’s power sector is the West African Power Pool (WAPP)’s nearly completed 1,357km long double circuit 225kV “CLSG” line, connecting the national power grids of Ivory Coast, Liberia, Sierra Leone, and Guinea (African Development Bank). It will provide a new high-voltage backbone line running from north to south, through the middle of the country, to which other planned national transmission lines can be connected. Additionally, it offers a key opportunity to address the issue of inadequate generation, providing access to external surplus generation (such as Guinean hydropower) and stimulating private

investment in generation by expanding the market. It is expected to be completed in 2024. Currently, Sierra Leone does not import or export electricity.

1.4 Market Structure:

Legally, the national utility EDSA has an exclusive license to sell and distribute electricity throughout the country. However, recognizing the need and opportunity for private investment in the power sector, the National Power Authority (NPA) allows for licensing and regulation of both privately operated mini-grids in rural areas where EDSA has no facilities as well as Independent Power Producers (IPPs) either selling into the grid or to single larger clients – the latter, again only where EDSA is absent.

Electricity generation and access remain low, with only 300 MW of installed generating capacity as of 2023, and only 15% of the population is connected to the grid. This reflects a limited and dilapidated power infrastructure based on generation, transmission, and distribution. The national distribution network is limited to Freetown and the surrounding Western area, covering about 40% of the residents. Two isolated systems, the Bo-Kenema and Makeni systems, provide coverage in delimited areas of the southeastern and northern regions. In rural areas, where most of the population resides, electricity access is practically nonexistent. Most of the rural population relies on inefficient and polluting traditional fuels, such as kerosene for lighting and fuel wood and charcoal for cooking, with the attendant adverse impact on personal health and safety and environmental degradation. Electricity tariffs remain among the highest in Africa, with an average tariff of 18 US cents per kWh, yet they do not ensure cost recovery. As a result, national electricity utilities remain strongly dependent on government subsidies. The generation capacity remains highly inadequate to accommodate the overall demand. In 2023, the installed capacity was approximately 300 MW connected to the national grid, including a seasonal 50 MW from the Bumbuna Hydropower plant. The rest was produced from thermal plants to serve Freetown and its outskirts, excluding power rentals from Independent Power Producers (IPPs). High costs of imported fuel for thermal power plants, as well as transmission and distribution bottlenecks, further compromise generation and supply. The Government has set an ambitious target to increase installed electricity generation capacity from its current 300 MW to 850 MW by 2030.

1.5 Responsible government department: (include key contacts)

Institutional Framework

Ministry of Energy -The primary responsibility of the Ministry of Energy is to formulate and implement policies, projects, and programs on energy and provide oversight functions across the entire energy supply chain for all sector agencies EGTC, EDSA, EWRC and other forms of energy supply and utilization.

Electricity Generation & Transmission Authority (EGTC) - EGTC is responsible for electricity generation and transmission from the generation stations to the EDSA Substations.

Electricity Distribution & Supply Agency (EDSA) - EDSA is responsible for the supply and distribution of electricity to the consumers.

Electricity & Water Regulatory Commission(EWRC) - EWRC regulates the utility service providers in the electricity and water sectors in line with the provisions of the Sierra Leone Electricity and Water Regulatory Commission Act 2011.

Regulatory Framework

Policies and Legislation

- The National Energy Policy of 2016 which focuses on Universal energy access, renewable energy promotion and sectorial reforms.
- Renewable Energy Policy of 2016 which governs Solar, hydro, and biomass development, feed-in tariffs from private developers and mini-grid development.
- Rural Renewable Energy Strategy (2015) pushes for Off-grid electrification through solar and hydro mini-grid projects.

Acts

- Electricity Act (2011) - The act establishes a legal framework for generation, transmission, and distribution of electricity within Sierra Leone.
- Energy Sector Regulatory Authority Act (2011) - This act creates ESRA as an independent energy regulator.
- Public Private Partnership (PPP) Act (2014) - This act enables private investment in energy infrastructure.

Regulations

- Electricity Licensing Regulations issued by ESRA - These are rules governing generation, distribution, and supply licenses within Sierra Leone.
- Tariff Setting Methodology issued by ESRA - These regulations guide electricity pricing approval from different producers.
- Renewable Energy Feed-in Tariff Regulations issued by ESRA - This Regulations Incentives for renewable energy producers.
- Mini-Grid Regulations issued by MoE/ESRA - These regulations provide for Standards for off-grid renewable energy systems.

Codes

- Grid Code - These are technical codes for transmission and distribution network operations.
- Distribution Code - These are technical codes that provide for EDSA's distribution network standards.
- Metering Code - These are technical codes for electricity metering and billing.
- Health & Safety Code - These are operational codes that provide for Worker/public safety in the energy sector

Standards

- IEC 61439 - Adopted for solar panel installation work.
- IEEE 1547 - Adopted for renewable energy grid connection.
- SLEMA - Adopted for Impact assessments for energy projects
- Sierra Leone Bureau of Standards (SLBS) - These standards provide provides general quality for energy equipment

Source: [Policies and Legislation, Acts, Regulations, Codes, Standards](#)

1.6 Existing/Planned energy legislation: (is there a CPO)

Until recently, the key documents coordinating MoE's efforts were the National Energy Policy (NEP 2009) including the renewable energy framework (still unratified); the National Energy Strategic Plan (2014 - 2017); the National Renewable Energy Policy of Sierra Leone (NREP), adopted by cabinet in May 2016; the National Energy Efficiency Policy of Sierra Leone (NEEP) adopted by cabinet in May 2016, and; Sustainable Energy for All Action Agenda (SE4ALL AA), National Renewable Energy Action Plan (NREAP), National Energy Efficiency Action Plan (NEEAP)—each validated in 2015. These documents, however, have been subsumed under the

2019 National Medium Term Development Plan (MTDP), which collates, updates, and supersedes them.

The government has recently revised mini-grid regulations (2024) to simplify licensing for solar off-grid and allow developers to set cost-effective tariffs approved by the EWRC. The draft Electricity Act of 2024 aims to unbundle EDSA’s transmission and distribution roles and allow provision for the feed-in tariff.

The MTDP recognized that improving energy supply, supporting infrastructure, and particularly renewable energy supplies and distribution, are foundational to achieving many of its goals. In the context of policy clusters 2 and 6, the MTDP consistently identifies improved electricity supply as a “critical enabler” for both stimulating domestic entrepreneurship and attracting foreign direct investment, supporting sustainable growth.

As emphasized throughout the plan, key obstacles to the achievement of these objectives are a) the “weak and mostly underdeveloped” capacity of central government Ministries, Departments and Agencies (MDAs) characterized by “low productivity and poor financial performance” and b) a financing gap of 1.55 billion for the 8.15 billion USD overall strategy. As a result, MTDP policy cluster 8 identifies increasing private sector investment as a crucial factor for success, particularly in electrical power generation.

Source: [Electricity Act 2011](#), [National Energy Policy](#), [Renewable Energy Policy](#), [Energy Efficiency Policy](#)

1.7 Environmental and Renewable Energy Legislation

Sierra Leone developed a Renewable Energy policy in 2016, although it has not been formally enacted into legislation, and the standard environmental protection law remains the de facto governing law. This policy is an ambitious plan to integrate and expand renewable energy into the country’s energy mix. Energy, including renewable energy, is treated as an infrastructure activity in the general planning and development of energy in Sierra Leone.

The closest legal framework for mapping out environmental legislation for renewable energy is the Environmental Protection Agency (EPA) of Sierra Leone’s environmental impact assessment (EIA) guidelines.

Additionally, within the MTDP, policy clusters 3 and 7 note the economic and environmental burdens associated with the extensive reliance on fossil-fuel-powered generators for electricity supplies. As a result, one of the government’s key targets under this cluster is to ensure an immediate transition to a greener economy by increasing the contribution of renewable energy to 65% of the nation’s energy production, while also increasing production more than threefold.

Source: [Renewable Energy Policy](#)

1.8 Existing/Planned energy certificate systems: (purpose, extent)

Currently, there is no existing certificate system in the country, and awareness of such systems is limited among relevant state and non-state actors. To stimulate the development of the renewable energy market, Energy Peace Partners is proposing to issue Peace Renewable Energy Credits (P-RECs) in Sierra Leone, offering a new way to monetize renewable energy generation from qualifying projects in the country.

Peace Renewable Energy Credits (PRECs) are unbundled environmental attributes designed to stimulate renewable energy market development in some of the world's most fragile and least electrified regions. P-RECs support and extend the impact of developers working in these challenging markets. At the same time, PRECs expand renewable energy purchase options in regions with limited infrastructure, particularly for consumers interested in meeting voluntary sustainability commitments and social responsibility objectives. By providing developers with more incentives and offering consumers more choices, PRECs extend the benefits of the renewable energy revolution to some of the most vulnerable communities on the planet (Energy Peace Partners, 2019).

1.9 Extent of engagement with government:

EPP has engaged with high-ranking Sierra Leonean government officials in pursuit of their consent and a letter of no objection in seeking to make Sierra Leone and IREC an issuing country.

1.10 Response from Government in relation to attribute tracking systems:

EPP has received encouraging feedback from the contacted officials, despite being slowed down by the recent elections in the country and the change of leadership that followed.

1.11 Proposed restrictions

1.12 Any other relevant information:

1.12.1 RE Market Potential:

There is strong potential for renewable investment in hydroelectricity and solar. In its most recent NDC in the Paris Agreement, Sierra Leone defined a progressive path to reduce greenhouse gas emissions by 5% by 2025, 10% by 2030, and 25% by 2050 compared to 2005 levels. The updated NDC also includes specific strategies and goals, along with quantifiable targets for integrating renewable energy into the mix. The goal is to improve energy efficiency and increase access to grid connections by 42% by 2025, and to increase access to off-grid mini-grids and solar standalone systems by 27% and 10%, respectively, by 2030. .

The country has numerous waterfalls suitable for hydropower, with an estimated project potential of more than 1,000 MW. The government has identified up to 27 hydropower sites suitable for development, including a large-scale project at Bikongor with a generation potential of up to 200 MW. In addition, there are mini-hydro plants with a capacity of less than 1 MW, which are expected to become a significant area for public-private partnership investment.

There are also ample opportunities for solar power generation, with an estimated potential of 240 MW. There are plans in place to capitalize on the estimated annual horizontal irradiation of 4.1-5.2 1460 kWh/m of solar radiation in Sierra Leone, according to the Ministry of Energy and Water Resources. Although interest in solar PV-based generation has increased considerably in recent years, progress has been slow, and the resource remains underexploited. The only publicly owned resource is a 6 MW solar farm in Newton, near the capital city of Freetown, which was funded by the Government of Sierra Leone (GoSL) and the Abu Dhabi Fund for Development (ADFD) through the International Renewable Energy Agency (IRENA).

Aside from this plant, the government has proven interest in establishing renewable energy infrastructure, especially in rural regions. Sierra Leone has recently launched a Rural Renewable

Energy Project. The first phase involved installing solar power at 54 community health centres across 12 districts in Sierra Leone, and the second phase will continue to strengthen energy services nationwide. Currently, there are ongoing donor-funded and privately developed small solar mini-grids under construction across the country, aiming to increase electricity generation by between 15 and 50 MW over the next five years.

There are also plans to initiate utility-scale power generation projects in Bo, Fourah Bay, and Njala University, as well as small-scale development projects, such as solar-powered streetlights in rural communities.

Wind Energy is a less prominent option, but with average velocities ranging between 3 and 5 m/s and up to 8 m/s or even 12 m/s in some areas, it could also contribute by utilizing the low-speed turbines currently available.

1.12.2 Historical support or development of renewables in the country/region:

Before 2016, there had been no legislation specifically governing the development of renewable energy. The 2009 National Energy Policy included a renewable investment framework, but it was not ratified. Thus, the National Renewable Energy Policy of Sierra Leone (NREP), adopted by the cabinet in May 2016, was the first policy directed at renewable promotion.

The Renewable Energy Policy of Sierra Leone (2016) was adopted as an ambitious plan to integrate and expand renewable energy into the country's energy mix. Overall, energy, including renewable energy, is treated as an infrastructure activity in the general planning and development of energy in Sierra Leone.

As of 2022, the MOE plans to detail a feed-in tariff policy that will specify maximum feed-in tariffs for specific technologies and different capacity ranges, ranging from 500 kW to 3-5 MW.

1.12.3 Demand-side market potential or strategic nature of market development:

Legislative developments since 2018 have significantly improved the renewable energy investment landscape in Sierra Leone, with international support also increasing in recent years. In 2021, the International Development Association, with approval from the World Bank Board of Executive Directors, approved a \$50 million grant to improve electricity access and enhance the institutional capacity and commercial management of the sector.

1.12.4 Analysis of political disruptions or market risks:

Sierra Leone's poor and limited infrastructure poses significant challenges to effective commercial investments, as it limits domestic travel, inland transport, and normal operations. While the government has made significant efforts to alleviate these barriers, persistent challenges remain, including corruption, a lack of skilled labour, high interest rates, and obstacles related to contract enforcement. However, the government continues to inform investors that the country is open to foreign investment, and it has focused on removing trade constraints to gain investor interest.

1.12.5 Analysis of regulatory risks, including linkages with carbon markets and support systems:

Sierra Leone’s low regulatory capacity and high levels of corruption result in weak market regulation. However, within the existing market structure, IPPs are regulated to either sell power directly into the national grid or to larger private clients in regions where the EDSA is absent ([World Bank - Legal and Regulatory Framework Analysis, 2019](#)). There are currently no support systems for carbon markets.

1.12.6 Current environmental reporting in energy:

To our knowledge, there is none currently, beyond the monitoring of project operations by the Environmental Protection Agency (EPA-SL) and occasional media stories.

1.12.7 Mechanisms in place to support the reliable verification and issuance of I-RECs:

Not Available at the moment

1.12.8 Local organizations of importance and their opinion on local I-REC market development:

The International Tracking Standard Foundation (I-TRACK Foundation) has signed a Memorandum of Understanding (MoU) with the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) to support the development of REC markets in West Africa. Currently, there is no local organization with an interest in developing the I-REC market. However, Energy Peace Partners is in touch with developers interested in having P-RECs issued for their projects in Sierra Leone.

1.13 Author(s)

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