ENERGY
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Country Guide: Sierra Leone

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Sierra Leone is located on the southwest coast of West Africa. It is bordered by Liberia to the southeast, Guinea to the northeast and the Atlantic Ocean to the west and southwest. Sierra Leone has a tropical climate with a diverse environment ranging from savanna to rainforests. It consists of two distinct seasons: the rainy season from May to November, and the dry season from December to May.

Sierra Leone held its last general elections on March 7 2018 to elect a cabinet, in the fourth cycle of elections since the civil war in 2002. The opposition candidate, Rtd. Brig. Julius Maada Bio of Sierra Leone People's Party (SLPP), won the election.

Figure 1 Map of Sierra Leone. Source: d-maps

Economy

Until the Ebola outbreak in May 2014, Sierra Leone was seeking to attain middle-income status by 2035, but the country still carries its post-conflict attributes of high youth unemployment, corruption and weak governance. It continues to face the challenge of enhancing transparency in managing its natural resources and creating fiscal space for development. Problems of poor infrastructure and widespread rural and urban impoverishment persist despite remarkable strides and reforms.

Real Gross Domestic Product (GDP) growth dropped to 3.5% in 2018 from 4.2% in 2017. It improved slightly to an estimated 5% in 2019, driven by the agriculture and services sectors, as well as the mining industry in the first half of 2019.

Sierra Leone is a member of the African Union, the United Nations, the Commonwealth of Nations and Economic Community of West African States (ECOWAS).

Agriculture will continue to drive the non-iron ore GDP growth. This will be spurred by increased investments and expansion in the crops, livestock and fisheries sub-sectors. The growth in services is expected to slow, however, due to weaker performance in tourism, transportation and communication.

The Sierra Leone Medium Term National Development Plan (MTNDP) 2019 -2023 aims to achieve middle-income status by 2039.

Measured by the national poverty line, poverty was 52.9 % in 2011 with no change since 2003. The official inequality measure, the Gini index, increased from 34 in 2011 to 35.7 in 2018.

In the yearly World Bank survey on "Doing Business", a comparison of business regulation in 190 economies, Liberia is among the top 50% countries. The 2020 edition of Doing Business ranks Sierra Leone as 58 out of the 190, with a score of 91.3 out of 100 for the ease of starting a business. Next to this indicator, the survey includes scorings for dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investments, paying taxes, trading across borders, enforcing contracts and resolving insolvency. Figure 2 provides a comparison of Sierra Leone to similar economies for starting a business.

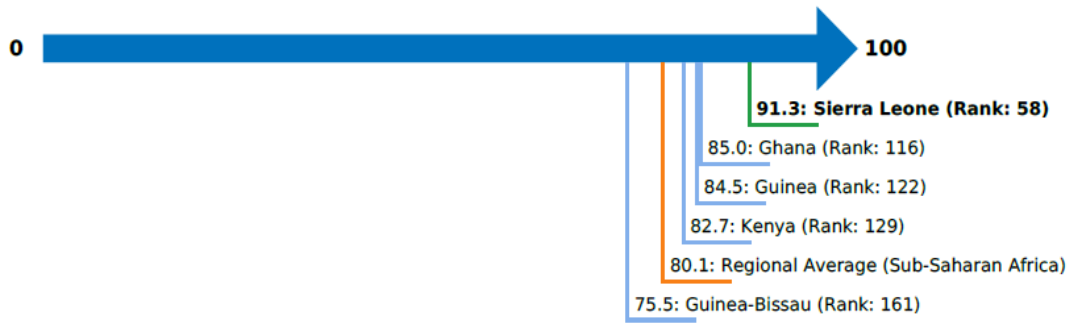

Figure 2 Doing Business 2020 score for starting a business. Data from: World Bank Group, 2020

The energy sector in Sierra Leone

As of March 2019, the installed electricity generation capacity in Sierra Leone was 113 MW. This is made up of 75 MW of hydropower, 4 MW of solar and 34 MW of bioenergy. The nationwide electrification rate was recorded at 5% (estimated at 12% in urban areas and 2% in rural areas) in 2018 with roughly 150,000 connected customers.

The country's energy needs are hugely under served, and the lack of a reliable energy supply is the primary obstacle to Sierra Leone's development. The current electricity tariff regime is heavily subsidised by the government.

According to the 2015 Sustainable Energy for All (SE4ALL) Country Action Agenda, the Sierra Leonean Government has set targets that will see an increase in electricity access from 13% in 2013 to 92% by 2030, and the renewable energy level from 43,464 GWh in 2013 to 111,780 GWh by 2030.

The 2015 Action Plan aims to achieve the following objectives by 2030:

1. Increase nationwide electrification rate to 92%
2. Install electricity generation capacity from renewable energy sources to 293 MW (excluding medium and large hydro)
3. 37% of rural population to be served from off-grid (mini-grids and stand-alone) renewable energy electricity services
4. 75% of population to have improved cookstoves
5. 1,880 residential houses (new detached house price higher than €75,000) to have solar thermal systems

In its Energy Sector Reform Roadmap, the Sierra Leonean Government intends to incentivise investments through the following actions:

Table 1: Sierra Leone at a glance

Capital	Freetown
Total Area	71,740 km^2
Population	7,650,154
Official languages	English Krio
Rural Population	58% (2018)
GDP	US $4.085 Billion
GDP Per Capita	US $499.43
Currency	Leone (SLL)
Exchange rate 01/03/2020	1 GBP = 12445 SLL
Exchange rate 01/03/2018	1 GBP = 10565 SLL
Access to Electricity	14% (2018)
Urban electricity access	12%
Rural electricity access	2%

1. 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 to reach the poorest consumers in the population
2. Clarify the role of off-grid technologies in the public service electricity supply through defining ownership structures and ownership eligibility
3. Streamline the financing process for off-grid electricity supply activities, with clear guidelines on documentation requirements
4. Incentivise the co-financing of distributed electricity generation technologies using renewable energy after assessing the risks and benefits
5. 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)

Table 2: Overview of the main stakeholders in the energy sector in Sierra Leone

Institution	Role
Ministry of Energy	Formulates and implements policies, projects and programmes on energy and provides oversight functions across the entire energy supply chain for all sector agencies
Electricity Distribution and Supply Authority (EDSA)	Responsible for the distribution and supply of electricity in Sierra Leone
Renewable Energy Association (REASL)	Promotes the interest of public and private renewable energy sector stakeholders through advocacy, lobbying and marketing Disseminates information on local and global issues, policies, new technologies and business models within the sector
Public Sector Reform Unit (PSRU)	Provide strategic guidance in the design, implementation and monitoring of programmes and activities towards improved service delivery

Small hydropower

As of 2015 the large scale hydropower generation installed capacity was 50 MW. The government intends to increase the capacity to over 800 MW by 2030. The bulk of electricity supplied to consumers through the Electricity Distribution and Supply Authority (EDSA) is from the Bumbuna Phase I hydropower plant, which is located on the Seli River in the Tonkolili district.

The government is looking into extension of the Bumbuna Phase II project on Bumbuna Dam and construction of a new dam upstream at Yiben, approximately 30 km north of the Bumbuna Dam. The Bumbuna extension will include two 42.15 MW turbines and a 3.7 MW small turbine. A new power intake structure will be built approximately 400m upstream of the existing dam.

Sierra Leone has four other small hydroelectric power plants with a total capacity of no more than 12 MW, which are:

1. Bankasoka Hydropower, a 3 MW run-of-river plant in Port Loko
2. Charlotte Falls Mini-Hydro Dam, z 2.2 MW plant in the Orugu region.
3. Dodo Mini-Hydro Dam, a 6 MW run-of-river plant in the Dodo region, Eastern Sierra Leone
4. Yele/Makali Dam, a 250 kW dam located in the north of Sierra Leone.

Solar energy

In February 2017, Sierra Leone was the first African country to sign the "Energy Africa Policy Compact" with the UK Government. As part of the compact, the Energy Revolution Initiative (ERI) was launched, committing to connect 250,000 households with modern energy solutions by 2018. A task force was established and for the government and the private sector, the focus shifted notably to renewable energy, especially solar energy. There is no indication, however, of whether the target was achieved by 2018.

According to the “Renewable Energy Statistics 2019” report by IRENA, there is a total capacity of 4 MW installed in Sierra Leone. However, Joint Research Centre (JRS) of the European Commission revealed its solar potential to be as high as 2200 kWh/m^2.

Nevertheless, from 2014 to 2018 some bigger projects were implemented:

1. “Promoting Renewable Energy Services for Social Development” (PRESSD), 2014-2018: this involved the installation and operation of three solar mini grids in Segbwema, Panguma and Gbinti; the installation of SHS for approximately 100 charging centres, 20 energy hubs for agricultural business centres, 20 clinics, 12 schools and 12 financial service associations; the provision of equipment and training for three energy laboratories in cooperation with polytechnics; and sales of Pico PV products through local retailers.
2. The Ministry of Energy has installed 8,471 solar streetlights in the 14 district headquarter towns across the country. The facilities were handed over to the various district councils, city councils and local councils in 2017.
3. The Ministry of Health is implementing the Expanded Programme on Immunisation and has installed approximately 900 solar powered fridges, donated by UNICEF, since 2003 for the purpose of cooling vaccinations across the country. The programme is currently replacing old fridges.

Biomass energy

As of 2017, the total installed capacity generated from biomass was 33 MW with a potential to generate 2.706 GWh. According to the 2015 Population and Housing Census, 97% of the population in Sierra Leone use firewood or charcoal for cooking. Other sources, including gas, kerosene or electricity account for the remaining 3%. 65% of the households use firewood and 32% use charcoal on a national level.

Currently, the energy consumption in Sierra Leone is dominated by biomass, which accounts for over 80% of total energy used. The largest source of biomass energy is wood fuel, followed by charcoal, while the use of agricultural crop residues and bagasse in the sugar industry remains limited.

Three major biomass projects are currently operating in Sierra Leone:

1. The Addax Ethanol Project has a total capacity of 15 MW. It is located near Makeni region and produces bio-ethanol for export, domestic use and supply to the main Bumbuna-Freetown grid. The project, however, has experienced financial setbacks which have affected its operations.
2. Port Loko Thermal Power Station has a capacity of 30 MW used to generate heat and electricity.
3. Sunbird Bioenergy is a biomass plant with a capacity of 32 MW in Makeni.

The country's burgeoning bio-fuels sector has received increasing levels of Foreign Direct Investments (FDI) in recent years. The government is exploring opportunities for developing small-scale biomass for rural electrification and the potential use of biodiesel from palm oil or ethanol for domestic consumption.

Wind energy

According to the metrological statistics in 2012, Sierra Leone's best wind velocities indicate a country-wide average of between 3 m/s and 5 m/s, increasing to approximately 8 m/s in some mountainous areas. There is some indication that wind speeds of 12 m/s are possible in parts of the country, implying that wind energy could be a viable option in selected locations. Currently, Sierra Leone has one wind energy system of 5 kW located in the Bonthe District, along the southern coastline.

Mini grid sector development

Sierra Leone is one of the countries in sub-Saharan Africa whose progress in off-grid electrification has been relatively slow. This is mainly due to financial, regulatory and coordination constraints by the government. However, the government is determined to improve access and has made some steps to stimulate growth. These include:

1. Unbundling the energy sector by liberalising electricity supply and setting up a regulatory commission
2. Creating mini grid specific regulations in 2018, though these are yet to be approved by the parliament
3. Assigning a stronger role to the Sierra Leone Energy and Water Regulatory Commission (SLEWRC) in mini grid approval and tariff setting
4. Developing a 12-year electrification roadmap (2018 – 2030) which has provisions for mini grid development
5. Implementing country-wide programmes in partnership with international partners to enable private companies to develop mini grids

The government realises the importance of mini grids to reach a national electrification rate of 92% by 2030. Mini grids are considered the most suitable option to electrify about 27% of the un-electrified population in the country.

The draft 2018 mini grid regulations are a first step to improving the legal framework for private sector involvement in the mini grid space. Some of the key proposed features in the mini grid framework include:

1. Provisions for grid arrival
2. Provisions for setting cost-reflective tariffs using a pre-designed tariff tool
3. Licencing requirements depending on mini grid size, including clearly defined timelines for licence review and feedback on decision
4. Import duty waivers for all solar products as long as they meet the Lighting Global quality standards
5. Full private sector ownership of mini grids

It is worth noting that other aspects of policy and regulation still need to be improved for successful implementation of the framework.

First, clear responsibilities between ministries and other relevant agencies need to be outlined to allow for a better flow of information and enforcement of these regulations. There is currently no entity in Sierra Leone with a specific mandate to drive rural electrification in the country. This is being run by various departments in the Ministry of Energy and SLEWRC. The 2018-2030 plan, however, has set plans for the formation of a Rural and Peri-Urban Electrification Authority.

Second, existing regulations are not clear on permits for construction and operation for mini grids. Factors such as requirements for application, which entities are responsible for providing these permits, and requirements based on type or size of mini grid are not clear.

Third, the government is not clear on their future electrification plan. Some lots have been assigned to several private companies to develop mini grids, but it is not clear how this fits into the government's electrification plans.

Fourth, mini grids will need financial support to help accelerate development and mitigate risks associated with development in remote locations. Financing is presently only available in terms of split-asset investments to mini grids included in development programmes spearheaded by international organisations. There are plans to set up a Rural Electrification Fund to subsidise on-grid and off-grid rural electrification projects, but it is not clear when this will take effect.

Finally, though the government has set provisions for cost-reflective tariffs for mini grids, there is no clear indication on the willingness and ability to pay by customers. Benchmarking of customer segments is still needed.

It is not clear how many mini grid projects are active in Sierra Leone. Renewables Salone, an independent platform that provides information on renewable energy activities in the country, highlights 55 mini grids that have been developed through development programmes by UNOPS, ECREEE, USTDA and others. Very few private companies have developed mini grids without programme support. Some mini grid companies operating in Sierra Leone include:

- PowerGen (as WindGen)
- PowerNed
- Winch Energy
- Energicity (as PowerLeone)

Mini grid and off-grid programmes active in Sierra Leone are outlined in Table 3.

Table 3: Active support programmes in Sierra Leone	
Programme	**Main activities**
Rural Renewable Energy Programme (RREP)	Currently the largest active mini grid project in Sierra Leone. A £34 million programme funded by DFID and implemented by UNOPS in partnership with the Ministry of Energy of Sierra Leone. The project aims to develop off-grid electrification projects to rural communities in the country. Implemented in six main work packages: • Installing solar systems in 54 community health centres. 50 of these systems were expanded to solar mini grids to serve the surrounding communities and are managed by three private companies • Development of 44 larger mini grids through a split-asset model between the private sector (which will own the generation assets) and the government (which will own the distribution assets). The sites have been split into four main lots and allocated to the same companies managing the 50 grids above • Support to the ministry and other relevant energy agencies to strengthen the legal and policy framework for mini grids • Support on developing emergency earthworks in Freetown • Monitoring and evaluation • Productive use promotion in mini grid sites
The Sierra Leone Mini Grid Project	A $6.9 million partnership between InfraCo Africa and PowerGen to develop up to 41 solar mini grids in remote rural communities in the southern and eastern part of Sierra Leone. The project aims to make 12,500 new connections, 85% of which will be to households and 15% to enterprises and social institutions.
Mini grid feasibility study	A $907,195 project co-funded by USTDA and WindGen to conduct a mini grid feasibility study in partnership with the Ministry of Energy. The study aims to provide the ministry with technical, environmental, economic, social, and financial information required to implement at least 40 mini grids for communities and five mini grids for commercial and industrial facilities.
AECF/REACT Household Solar programme	Funding support for SHS companies, mini grid companies, clean cookstove companies, innovative distribution models for off-grid energy, and innovative ideas to stimulate “next generation” approaches to renewable energy. Support is in the form of interest free loans, non-repayable grants, and technical assistance. Roll-out to Sierra Leone companies done in the Round 1 call in 2017. Implementation is ongoing.
Regional Off-Grid Electrification Project (ROGEP)	A $200 million project funded by the World Bank and managed by ECREEE. Targeting 15 countries in the ECOWAS region and four countries in the Sahel region, with a focus on mobilising private sector investment in the off-grid electrification space. The project has three main components: • Technical assistance to the public and private sectors • Access to finance for off-grid energy projects through local financial institutions • Support to electrify public institutions
The Green Mini Grid Help Desk	Mini grid developers receive technical assistance, from support on demand assessments to technical sizing, capital raising, procurement and installation support, commissioning, and optimisation of operations.
FEI OGEF	A $100 million blended finance debt fund managed by Lion’s Head Global Partners. Provides equity and debt to off-grid renewable energy companies to accelerate access to clean electricity in off-grid and underserved communities in Sub-Saharan Africa, and to involve local financial institutions in financing off-grid energy companies.

Industry associatons

The **Renewable Energy Association of Sierra Leone (REASL)** is a trade association that is focused on the development of an efficient and thriving renewable energy market in Sierra Leone. REASL was formed in 2016 as a direct response to the Energy Africa Compact, a UK aid initiative that partners with government and donors to accelerate energy access through a market-based approach. Its key roles include advocacy, lobbying, marketing and disseminating information on local and global issues, policies, new technologies and business models within the sector.

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