



Ministry of Foreign Affairs

Sector Scan

The Energy Sector in Sierra Leone

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Sector Scan

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December 2017

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Sierra Leone Netherlands Business and Culture Council



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The Sierra Leone Netherlands Business and Culture Council (SLNBCC) is an affiliate of the GNBCC, Ghana. The SLNBCC has been officially registered and active since September 2017, and is currently building a network of companies from Sierra Leone and the Netherlands. The target being collaborations, investments or partnerships between companies from the two countries.

Our network consists of both government and the private sector actors, and we work closely together with the Sierra Leonean Investment and Export Promotion Agency (SLIEPA) and the Sierra Leonean Chamber for Agribusiness development (SLeCad). The SLNBCC is expanding its membership base, these members receive:

- Monthly newsletters
- Quarterly networking events
- Access to Dutch network, to Dutch companies with interest in Liberia/Sierra Leone and introductions
- Access to more information on the Netherlands Enterprise Agency's (RvO) financial instruments
- Workshops and seminars on business related topics

The SLNBCC also offers paid business services to both members as well as non-members. These services include:

- Assisting with travel arrangements for business investors from the Netherlands to Sierra Leone
- Representing and assisting Dutch companies who do not have their own subsidiary, partner or office in Sierra Leone

TABLE OF CONTENTS

| | |
|-------------------------|-----|
| 1. Executive Summary | 4. |
| 2. Acronyms | 5. |
| 3. Sierra Leone Context | 6. |
| 4. Country Overview | 8. |
| 5. The Energy Sector | 9. |
| 6. Hydropower | 11. |
| 7. Solar Power | 12. |
| 8. Bio Fuels | 13. |
| 9. Thermal Energy | 14. |

Chapter 1 | EXECUTIVE SUMMARY

The SNBCC conducted this study to explore business environment in Sierra Leone, specifically analyzing the energy sector and the potential it holds for Dutch businesses. Data was gathered through desk research, key informant interviews and discussions with sector specialists.

The country's energy needs are hugely under-served and the lack of a reliable energy supply is the principal impediment to Sierra Leone's development. It also creates vast opportunities for Dutch companies working in creative power generation solutions.

Sierra Leone currently has only 99.6 MW of installed power capacity. To augment the country's energy needs, a cocktail of interventions are being pursued. Thermal generation, hydroelectricity and solar energy generation are employed in different parts of the country. A number of Donor partners including the World Bank, JICA and other Public Private Partnerships arrangements are being used.

Potential business areas that could be of interest to business institutions for future intervention, include: thermal electricity generation and sales, construction and installation of hydroelectricity systems and the construction and installation of solar electricity systems and sale of solar energy products. Also, using the Addax model, setting up biomass electricity generation and sale. Another prime area identified is the use of palm products in the production of diesel. Interesting business opportunities do not only lie in specific subsections of the energy sector, there are also certain interventions which are of interest to Dutch companies:

| Subsections | Interventions |
|---------------------|---|
| Thermal electricity | Increasing generation capacity |
| Hydro electricity | Construction of new transmission and distribution lines |
| Solar electricity | Expand solar power to all chiefdoms |
| Biomass electricity | Exploration / establishment of additional power capacity includes biomass, hydro and solar energy |
| Palm products | Marketing and capacity building of institutions in the energy sector |

The study concludes by encouraging the Dutch Governments and Business Institutions investing in the energy sector of Sierra Leone to achieve a double fold objective: - contributing to the development of the country and making steady economic and financial gains from prudent investment.

Chapter 2 | ACRONYMS

| | |
|--------|---|
| DFID | UK Department for International Development |
| EDSA | Electricity Distribution and Supply Authority |
| EGTC | Electricity Generation and Transmission Company |
| EU | European Union |
| EWRC | Electricity and Water Regulatory Commission |
| GDP | Gross Domestic Product |
| GoSL | Government of Sierra Leone |
| IDB | Inter-American Development Bank |
| IPP | Independent Power Producers |
| JICA | Japan International Cooperation Agency |
| PPP | Public Private Partnership |
| SLeCad | Sierra Leonean Chamber for Agribusiness development |
| SLIEPA | Sierra Leone Investment & Export Promotion Agency |
| SLNBCC | Sierra Leone Netherlands Business and Culture Council |
| SLPA | Sierra Leone Port Authority |
| UNDP | United Nations Development Programme |

Chapter 3 | SIERRA LEONE CONTEXT

Sierra Leone is found in the West Coast of Africa, bordered by Guinea and Liberia. It has been experiencing annual GDP growth. Several years back, the country's GDP growth rate was one of the highest in Africa, but had a quick downward turn due to the twin shocks of a shrinking of the global iron ore price and the outbreak of the Ebola Virus Disease. However, Sierra Leone is actively reforming its business environment in order to facilitate the ease of doing business in the country.

History & politics: Sierra Leone gained independence from Britain in 1961. From 1961 to 1998, the political system shifted between multi-party democracy, military rule and one-party rule. Sierra Leone has remained a multi-party democracy since 1998. The country emerged from a decade-long civil war in 2002. The constitution recognizes three branches of government: legislative, executive and judicial. Parliamentary terms last for five years and the President may not serve for more than two terms, whether or not those terms are consecutive. The current President, Ernest Bai Koroma of the All People's Congress Party, is serving his second term, having been re-elected in 2012 (winning 58.7 percent of votes). His party also holds 67 of the 112 nationally elected seats. Paramount chiefs fill 12 additional seats in separate elections. A total of ten parties took part in the 2012 elections, which were peaceful and transparent. The next elections are due to be held in early 2018. The constitution, as currently drafted, does not allow an incumbent to stand for a third term. A peaceful, credible and stable transition of power would increase investor confidence by providing a reduced risk of shock and greater predictability.

Governance: The Government of Sierra Leone is led by a President elected directly by the people and who is also the Head of State and Commander-in-Chief of the armed forces. Within the Government of Sierra Leone, the Ministry of Trade and Industry has oversight over policies relating to domestic and international trade. The Sierra Leone Investment & Export Promotion Agency (SLIEPA) is responsible for policies to improve the investment climate, promote local and export trade, and encourage the development of small-to-medium-sized businesses. SLIEPA has thus far focused on Foreign Direct Investments in key economic sectors including the agriculture, marine resources, mining, energy, and tourism sectors. A system of local government was established by the Local Government Act 2004, which is comprised of 19 councils. Five city councils, one municipal council, and 13 district councils form the total of this local government structure. The Decentralization Secretariat was established under the World Bank's Institutional Reform and Capacity Building Project to promote decentralization.

Core industries: Agriculture (key crops: rice, sugar, oil palm and cocoa, as well as agribusiness functions relating to trading and/or processing); diamonds (over 600,000 carats exported in 2013), iron ore (one of the world's largest iron ore deposits at African Minerals' Tonkolili mine contains an estimated 12.8 billion tonnes), rutile (the world's largest reserves, producing an estimated 120,000 tons of contained titanium dioxide in 2014), gold (producing approximately 141 kilograms worth of gold in terms of mine output in 2012 and 193 kilograms in 2014) and bauxite mining (including

the country's Portloko deposit, which contains 100 million tons of bauxite reserves). Tourism is another key sector in the country, with potential to tap into Sub-Saharan Africa's US\$66 billion tourism industry.¹

Key exports and imports: Sierra Leone's main exports are in the mining and agriculture sectors. Until 2012, diamonds were Sierra Leone main export product. Iron ore has since taken its place, accounting for 55.7 percent of total exports in 2013. The mining sector accounts for roughly 90 percent of annual export revenues. In 2015, Sierra Leone's exports were worth approximately US\$765 million, of which mineral resources accounted for approximately 75 percent, followed closely by cocoa (8.5 percent) and coffee. Sierra Leone's main imports are machinery and transport equipment (largely relating to mining and oil investment projects and accounting for approximately 50 percent of total imports) and fuel (10 percent).

Foreign Aid: The country remains largely dependent on foreign aid. The current account deficit was estimated to be US\$511.8 million in 2013 and US\$466.9 million in 2014. The deficit was reported to be around US\$582 million in 2015. Sierra Leone benefits from the support of various international agencies, including the United Nations Development Programme (UNDP), the World Bank, and the UK Department for International Development (DFID).

The Ports: Freetown boasts one of the largest deepwater natural harbours in Africa. The existing QE2 Freetown container port is currently managed by Bolloré Africa Logistics under a 20-year concession agreement awarded by the Sierra Leone Port Authority (SLPA) in 2010. The agreement includes plans to renovate the port's bulk handling terminal and expand its capacity. GoSL is also considering developing a "dry port" to ease congestion at QE2 and facilitate the transportation of containers destined for rural areas.

Further efforts to involve private partners in the ports system have seen the SLPA award a 20-year concession for the Marine Slipway and Ship Repair facilities to Holland Shipyard.

To support the needs of the mining sector, the GoSL plans to develop a new deepwater port and associated rail infrastructure with the capacity to export between 30-50million tonnes of ore and other minerals each year. A pre-feasibility study to review options for the new deepwater port was commissioned by the GoSL in 2014. The World Bank is carrying out the study as part of a project to develop a "Ports Master Plan" assessing the need for the expansion of the Freetown Port and the feasibility of the proposed deepwater port. It is hoped that the study will also consider the potential for shared use at the Tonkolili and Pepel ports.²

¹ GoSL, SLIEPA, UNDP

² *Sierra Leone: An Investor's Guide – A Private Sector Perspective on the Investment Landscape*, p36

Chapter 4 | COUNTRY OVERVIEW

Population: 7,092,113 (according to the 2015 census by Statistics Sierra Leone); Around 38 percent of the population live in urban areas.

Geography: Situated in West Africa. Bordered to the west by the Atlantic Ocean, to the north and northeast by Guinea and to the south and southeast by Liberia.

Area: 71,740 square kilometers.

GDP: The GDP of Sierra Leone fell from 4.3 billion US dollars (2015) to 3.67 billion US dollars in 2016 and the GDP Annual Growth Rate grew to 4.30 percent in 2016 from -21.10 percent fall in 2015. Though there was an annual GDP growth rate was 5% in 2017.

Real GDP growth rate³

| | | | | | | |
|-------|------|--------|-------|-------|------|-------|
| 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
| 4.2% | 8.1% | 5.4% | 3.2% | 5.4% | 6.3% | 15.2% |
| 2013 | 2014 | 2015* | 2016* | 2017* | | |
| 20.7% | 4.6% | -21.1% | 4.3% | 5% | | |

**Estimate*

Official language: English

Population without electricity: 5,800,000⁴

Electrification - total population: 5%

Electrification - urban areas: 11%

Electrification - rural areas: 1% (2013)

Electricity - installed generating capacity – 100KW

Electricity – from fossils fuels - 33.3% of total installed capacity (2012 est.)

Electricity - from hydroelectric plants: - 66.7% of total installed capacity (2012 est.)

³*Global Finance (2017, November 2nd). Retrieved from: <https://www.gfmag.com/global-data/country-data/sierra-leone-gdp-country-report>*

⁴*The CIA World Factbook (2017). Retrieved from: <https://www.cia.gov/library/publications/the-world-factbook/geos/sl.html>*

Chapter 5 | THE ENERGY SECTOR

Sierra Leone currently has 99.6 MW of installed power capacity for a population of approximately 7 million persons. To augment the country's energy needs, a cocktail of interventions are being pursued. Thermal generation, hydroelectricity and solar energy generation are employed in different parts of the country. A number of donor partners including the World Bank, Japan's International Cooperation Agency (JICA) and other Public Private Partnership (PPP) arrangements are being used.

The country's energy needs are hugely under-served and the lack of a reliable energy supply is the principal impediment to Sierra Leone's development. Electricity transmission and distribution network problems result in losses of around 45 percent of generated electricity. The mining sector relies primarily on in-house captive generation to meet its large power demand and those not in the mining sector often use private generators. Estimates made in late 2013 suggest that around 33,000 diesel generators were used in Sierra Leone at that time, providing a capacity of approximately 180 MW.

Off-grid power generation in 2012 totaled approximately 260 MW. Increasing generation and improving transmission and distribution continues to be a priority for the government, which has budgeted US\$15 million for procurement in the sector in 2015. A holistic reform package is well under way to address structural, managerial, and financial network bottlenecks, paving the way for future investment. To support this, donors such as the World Bank, JICA and the Inter-American Development Bank (IDB) have provided funding of over US\$45 million for the national network upgrade and expansion. Positive steps have been taken in the development of projects to increase generation capacity and the construction of new transmission and distribution lines to improve access to more reliable power.

Combined urban, industrial and regional demand in 2015 has been estimated at around 315 MW, with 187 MW of that demand coming from the mining sector. Demand is projected to grow significantly in the near future. To meet this demand, the government aims to increase generation from 99.6 MW to 1,000 MW by 2018 through a range of new thermal, hydro, heavy fuel oil (HFO) and biomass projects, and to improve the country's overloaded transmission and distribution networks. The government recently carried out an electricity tariff review with the aim of promoting sustainable cost-recovery in the power sector. The renewables side of the sector remains a promising growth area for the country.

A large part of the electricity network suffered damage during the war. Activities in recent years have concentrated on bringing the existing network back to operation. The current electricity system covers mainly the western region of the country. The bulk of electricity consumption takes place in Freetown, the capital city. The Energy sector is an emerging sector which has been underused for decades in the country. The opportunities for growth within this sector are immense.

The present Government identified the energy sector as a priority and has hence made a number of legislative, regulatory, structural and infrastructural reforms that are yielding fruits. As an emerging sector, its potentials are very visible in the communities and have gained the attention of petty business people to large multilateral businesses that are primarily dealing in energy products. The main interest of Sierra Leone as a country is how to increase the amount of energy /electricity generated to meet the demands of communities and the ordinary man. From availability and accessibility to energy and electricity products, it goes without saying that all components and products in the Energy Sector are in short supply above the demand of the people, communities and the country at large. The following chapters outline the main feasible and viable business potentials that can improve electricity generation in Sierra Leone's energy sector

Chapter 6 | HYDROPOWER

Up to 5000MW capacity in total, with sites ranging from 2MW to 160MW

Hydroelectricity is the main energy source in Sierra Leone. Sierra Leone is known to have numerous potential hydroelectricity sites (above 20) that have total capacity 1,200 MW according to the 1996 Lahmeyer International Power Sector Master Plan. At the moment there are only two main hydro stations; Bumbuna and Dodo, that are producing electricity above 2 MW. This great hydroelectricity potential of the country should be harnessed if Sierra Leone should ever have any sustainable electricity production. The gap between the available hydroelectricity potential and the actual hydroelectricity in the country is appealing for investment.

Sierra Leone has significant hydropower potential. In addition to the expansion of the Bumbuna hydroelectric plant, the government has identified up to 27 hydropower sites suitable for development, with a total anticipated generation capacity of 1,513 MW. These include a large-scale project at Bikongor with generation potential of up to 200 MW and mini-hydro plants with a capacity of less than 1 MW, which are expected to become a major area for PPP and a means of widening access to power in Sierra Leone.

Chapter 7 | SOLAR POWER

Solar power options also present attractive investment opportunities. Plans are in place to capitalize on the estimated 2,180 hours of sunshine Sierra Leone receives a year. Plans include utility scale solar power generation projects in Bo, Fourah Bay, and at Njala University as well as smaller-scale developments such as solar-powered streetlights in rural communities. The evaluation process for phase II of the street light project, which involves the development of 50,000 solar-powered streetlights, was recently completed.

Solar power has the potential to greatly increase energy access in Sierra Leone and accelerate its economic growth. At the moment the solar energy products market in Sierra Leone is revolutionizing. A variety of solar products including cheap solar lights, solar rechargeable machines and small solar plants are being installed and used in the country.

Though there is high solar energy potential in Sierra Leone, there are currently no significant interventions to exploit and use this solar energy potential. On a national scale, government has provided solar street lights and solar lighting systems to remote communities. Data available on solar potential is scarce and needs further studies. Average horizontal irradiation of 4.1 – 5.2 kWh/m²/day (This data is in need of revision, as calculations were made from eight sites in 1996). The current installed capacity of solar PV is about 25 kW.⁵

⁵ AIDE Memoire – scaling-up Renewable Program in Sierra Scooping Mission

Chapter 8 | BIO FUELS

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. A variety of other supply-side opportunities, including fossil-fuelled plants, are also being considered. In particular, the government will be installing an additional 600 MW of thermal base-load capacity to expand access to electricity in provincial and districts headquarter towns.

Potential is high from forest resources, plus 656,400 tons of crop waste annually. Total generation potential is 2,706 GWh. Potential feedstocks' include rice husks and straw. There is also potential in terms of sugar cane. There has been substantial interest from investors in building ethanol fuel plants for exporting. Addax Bioenergy is the first of these initiatives that has materialized. The plant was installed and the project produced fuel ethanol from sugarcane and electricity for injection into the grid, using the residual bagasse. The plant was designed to produce about 90,000 m³ of ethanol per annum, primarily for export to the European Union (EU) market and 32 MW of electricity generation, of which about 15MW will be fed into the national grid. Though the project has been encountering some challenges, it was tested and was capable of producing both the ethanol and electricity. This is an area that can be explored for investment by Dutch businesses. As a member of the European Union, the Netherlands would benefit from cheap ethanol, while the electricity produced can be sold to the national grid to EGTC.

There have been pilot projects converting Palm oil to biodiesel. The biodiesel could be used as cooking fuel, transport fuel or fuel that can be used in thermal plants for the generation of electricity. This phenomenon is being criticized, as being anti-food security. However, the palm oil production in the country is still high and can serve the purposes of domestic household food use as well as converting it into other forms of energy products. Any significant intervention into the area would be accompanied by massive production of palm trees in line with the existing potentials in terms of available arable land. Cassava is also another product that can be used as an energy source, the waste water, peelings and solid residues from cassava processing could be used for biogas production.

Chapter 9 | THERMAL ENERGY

To be able to get a reliable power supply in the country especially in Freetown, in the short and intermediate terms, the Government has accommodated the use of the Independent Power Producers (IPPs) option. With this option, the IPPs generate power and sell it to the relevant state authority for subsequent transmission and distribution to consumers.

While the Government's energy target by the 2018 is 1000MW, only about 10% has been achieved. Even with the 10%, about 60% of it is provided through hydroelectricity. With the seasonal fluctuation in the production of electricity by the hydroelectricity plant(s), the service providers always turn to the use of thermal plants owned by the Government electricity institution and IPPs to augment power production. The provision, installation and generation of electricity by thermal plants serve as a quick way of resolving electricity problems and a potential area for investment.

Chapter 7 | POLICY & INSTITUTIONAL FRAMEWORK

The Agenda for Prosperity recognizes the various supply-side constraints in the country and the negative impact these can have on economic growth derived from other sectors such as mining and agriculture. In line with the objectives set out in the Agenda for Prosperity, the Government of Sierra Leone's (GoSL) Energy Sector Strategy aims to dramatically increase the availability of predictable and sustainable power in Sierra Leone while diversifying its power generation in order to develop an energy mix that will result in a tariff that consumers can afford.

The regulatory framework is conducive to investment in the energy sector. A company may be wholly foreign-owned and specific incentives exist for investments in what the government considers to be "pioneer industries", such as solar energy. The Ministry of Energy has implemented various reforms to improve governance and regulation and to encourage private sector participation and investment in line with the Agenda for Prosperity. These are legislated for in the National Electricity Act and the Electricity and Water Regulatory Commission Act, both of which were introduced in 2011. Reforms include winding-up the National Power Authority, unbundling the sector into two separate state-owned companies – the Electricity Generation and Transmission Company (EGTC) and the Electricity Distribution and Supply Authority (EDSA) – and establishing a regulator, the Electricity and Water Regulatory Commission (EWRC).

This reformed sector continues to operate under a "single-buyer" model, which requires power produced by private parties to be sold to the national electricity company (EGTC) or Government of Sierra Leone directly. The power is then sold on to the end consumer. The National Electricity Act enables the participation of independent power producers (IPPs) in power generation and distribution, and establishes a basis for power purchase agreements between relevant parties. As outlined further in the Infrastructure section below, government established a Public Private Partnership Unit in the Office of the President in 2010. The Unit is mandated to provide coordination and transactional support to the government, Ministries, Departments, and Agencies, including the Ministry of Energy, across a range of potential Public Private Partnerships. The Public Private Partnership Unit is developing a standardized power purchase agreement to simplify and expedite negotiations with investors in the energy sector.

The Government of Sierra Leone has taken steps to improve the regulation of the power sector, but the new regulatory environment is still in its formative stages. The transition to cost-reflective tariffs is important to support the government's ambitious plans for the sector and to continue to build the Electricity and Water Regulatory Commission's standing. In addition, the current lack of data and information (much of which was destroyed during the civil war) makes it difficult to fully assess the risks and rewards for investors in certain projects. The government has acknowledged the need to improve data collection and recording and has begun a pilot program at Bumbuna to monitor rainfall and river levels.



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This publication was commissioned by the ministry of Foreign Affairs

© Netherlands Enterprise Agency | July 2018
Publication number: RVO-137-1801/RP-INT

NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs and Climate Policy that implements government policy for Agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

Netherlands Enterprise Agency is part of the ministry of Economic Affairs and Climate Policy.