

ENACT

Enabling African Cities for Transformative Energy Access

Freetown City Energy Profile

APRIL 2024



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This city energy profile is developed as part of the Enabling African Cities for Transformative Energy Access (ENACT) project being implemented in Freetown, Sierra Leone and Kampala, Uganda, by ICLEI Africa and Mercy Corps - Energy 4 Impact. It aims to provide an overview of the energy landscape in Sierra Leone, especially Freetown, obtained through reviewing policies and energy grant frameworks and identifying public sector levers to enable energy access, including opportunities for improved policies.

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Abbreviations

AfDB	African Development Bank
CLSG	Côte d'Ivoire, Liberia, Sierra Leone and Guinea
DFID	Department for International Development
ECOWAS	Economic Community of West African States
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency
EDSA	Electricity Distribution and Supply Authority
EE	Energy Efficiency
EFA	Environment Foundation for Africa
EGTC	Electricity Generation and Transmission Company
EIB	European Investment Bank
EnDev	Energising Development
EU	European Union
FCC	Freetown City Council
FCDO	Foreign, Commonwealth and Development Office
FWT	Freetown Waste Transformers
GDP	Gross Domestic Product
GEAPP	Global Energy Alliance for People and Planet
GoSL	Government of Sierra Leone
ICS	Improved cook stoves
IDA	International Development Association
JICA	Japan International Cooperation Agency
LPG	Liquefied Petroleum Gas
MoE	Ministry of Energy
NDCs	Nationally Determined Contributions
NP	National Petroleum
RE	Renewable Energy
SDG	Sustainable Development Goals
SLEWRC	Sierra Leone Electricity and Water Regulatory Commission
SLL	Sierra Leonean Leones
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNOPS	United Nations Office for Project Services
USAID	U.S. Agency for International Development
WACCA	West Africa Clean Cooking Alliance
WAPP	West African Power Pool
WIESL	Women in Energy Sierra Leone

Introduction

Sierra Leone is a West African country bordered by Guinea and Liberia in the north, east and west, with the Atlantic Ocean on its southern borders. The capital, Freetown, is the largest city and commercial, administrative, business and educational hub of Sierra Leone. It is located around 8.46°N and 13.23°W in the Western Area Urban District of the Western Area province of Sierra Leone and covers an area of about 82 km² of the country's entire surface area estimated at 72,300 km². The Sierra Leonean population density is approximated at 103.92 persons/km² (City Population 2022). Freetown, with its population of 1,260,000 and population density of 6,241 people/km², ranks as the sixth most densely populated of the 28 Sierra Leonean cities and towns, with Bonthe ranked first (population density of 7,385 people/km²), and Kenema ranked second (6,992 people/km²) (Africapolis, n.d.).

The primary productive and employment sectors of the Sierra Leonean economy are agriculture (59.9%), service (34%) and industry (5.8%), which represent the backbone of the country's economy. According to the Sierra Leone Economic Update of June 2018 (World Bank Group, 2018), Freetown accounts for about 30% of the country's gross domestic product (GDP), despite having just about 15% of the population (Frediani, 2021) and occupying less than 0.5% of the land mass.



1.1 Climate and sustainability goals

The proof of climate change in Sierra Leone is evident in the increasing temperatures, rainfall variability, unpredictable extreme events, and sea-level rise the country experiences. These manifestations affect diverse facets of its socio-economic structure, especially in sectors particularly sensitive to climate change – energy production, forestry and agriculture. The Government of Sierra Leone (GoSL) recognises that climate change impacts must be mainstreamed into policies and sectoral activities to achieve sustainable green growth, evident in the Nationally Determined Contributions (NDCs).

Sierra Leone's NDC, which initially had only conditional commitments, was updated in July 2021. The updated NDC focuses on mitigation and adaptation measures to address climate change and provides more details on each sector's trends, strategies, and goals, with quantifiable targets. These goals include reducing greenhouse gas (GHG) emissions by 5% from 2005 levels by 2025, 10% by 2030, and 25% by 2050. They also aim to improve energy efficiency and increase access to grid connections by 42% in 2025, and off-grid mini-grid and solar stand-alone systems by 27% and 10%, respectively, by 2030. It further defines specific measures for each of the 12 priority sectors, which include Energy, Water Resources and Energy, and Environment, among others.

In the NDC, Sierra Leone has also expanded its adaptation targets and sought alignment with the Sustainable Development Goals (UNDP, 2024). The NDC is consistent with the Medium-Term Development Plan (2019-2023) and the National Climate Change Strategy and Action Plan (2015). Therefore, the scope of the actions in these plans seeks to promote policies driving both mitigation and adaptation while also driving synergies between the national and subnational government levels (GoSL, 2021).

At the local level, Freetown commits to reducing GHG emissions by 13% below base year (2018) levels by 2030 and at least 44% by 2050. The City plans to focus on urban energy, mobility, and sanitation as part of its mitigation efforts and on ecosystems and land restoration, disaster risk management, water, and urban planning to foster adaptation (Urban Shift & C40 Cities, 2022).

Geographic and demographic context

Freetown, located in the western area of the country, is the largest city and capital of Sierra Leone. Coupled with Bo, Kenema and Makeni, these cities provide over 70% of waged employment in the country. The major economic activities in the city include trade (38%), industry (16%), agriculture (6%) and other services such as transport and hospitality (40%) (Urban Shift & C40 Cities, 2022). The economic importance of the City to the country is also due to the location of the Freetown port, the principal commercial port of Sierra Leone, in Freetown.

In the post-independence period, many internally displaced persons (IDPs) sought refuge in Freetown and remained in the city after the 11-year civil war ended in 2002. Coupled with the Ebola pandemic and migration for better employment opportunities, this resulted in rapid population growth and a dramatic increase in population density. The population density in Freetown has been increasing over the years, from 769 people/km² in 1985 to 1,360 people/km² in 2004 and 2,154 people/km² in 2015. Its geographical peculiarity – the Atlantic Ocean to the west and mountains to the east of the city – constrains and impacts urban expansion, especially in the southern part of the city. Thus, much growth and development takes place on steep mountainous slopes and reclaimed land at sea level (Frediani, 2021).

2.1 Housing and informal settlements in Freetown

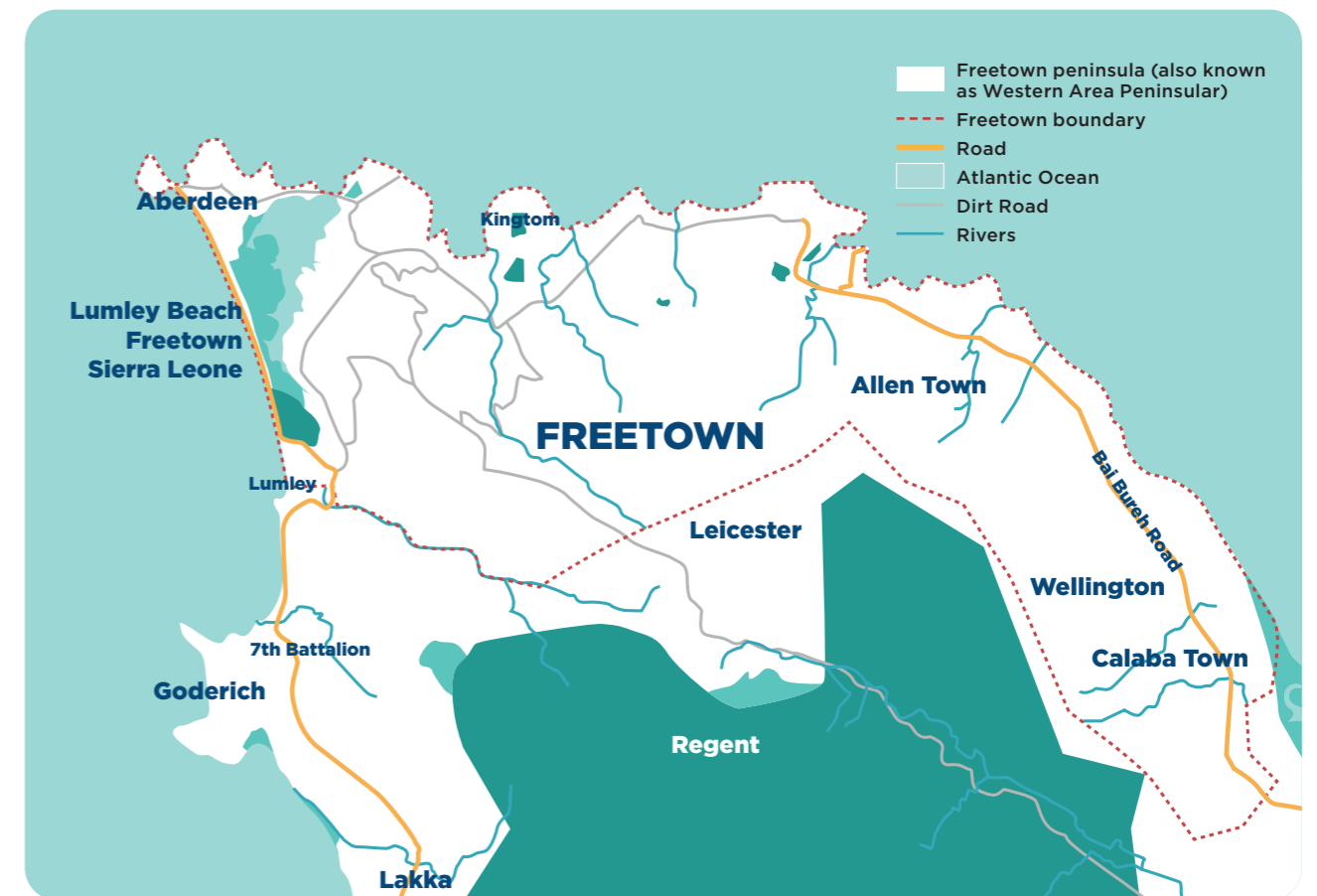
High population density, fragmented growth and unaffordable housing are some of the City's challenges, resulting in the proliferation of informal settlements and slum communities. With inflation rates of over 200% from 2002 to 2023, the rent for houses has increased proportionally, as house rental is normally pegged against the US dollar. This trend has increased the unaffordability of housing and resulted in more than 60 informal settlements scattered along the coast and the hillsides, which accommodate more than 30% of the City's population. According to the Africa Cities Research Consortium April 2022 Report, due to the high demand for housing, the most likely scenario for those looking for a place to live in one of Freetown's informal settlements, such as Kroo Bay, Susan's Bay, Falcon Bridge and Moa Wharf (Koroma et al., 2018) is that they will end up living in a "panbody"¹ shack. In contrast, some of Freetown's rich neighbourhoods, like Goderich and the expandable peninsular area, Juba, Hill Station, and Regent Village in the western area of Freetown, have middle-income earners and provide housing for about 60% of the population.

2.2 Climate hazards in the city

The city of Freetown, due to its topography, as mentioned above, is also highly exposed to landslides and floods, and most of the city's slums are in these areas, prone to environmental risks. While landslides such

as the 2017 landslides (in which over 2,000 people were killed overnight) are one of such hazards, flooding is a more common hazard in Freetown. Flooding regularly affects parts of Freetown during the rainy season, leading to annual average losses from flood damage as high as \$2.5 million a year (Ove Arup and Partners International Limited, 2018). The City is also vulnerable to extreme heat all year round due to rapid urban development, low levels of green cover and a historical legacy of deforestation to provide land to settle on and for charcoal production (Adrienne Arsht-Rockefeller Foundation Resilience Center, n.d.). The City is, however, already taking steps to combat rising temperatures with the appointment of a heat officer charged with awareness raising, data collection and monitoring the impact of heat on the city's population.

Figure 1: Map of Freetown, Sierra Leone



2.3 Access to water, sanitation and transport

Access to improved water sources and sanitation in Freetown stands at 75% and 30% of the population, respectively, and is less than the sub-Saharan Africa regional average for urban areas, which is 86% and 40%, respectively. Even so, access to these services is not evenly spread across the City; the City centre and the western part of the City systematically display higher access levels than the eastern area. As just about 5% of the land is covered by roads (compared with 10% in major African cities and 30% according to international recommendations), this, combined with the poor condition of the roads, hinders accessibility and leads to congestion. Formal public transport runs intermittently, thus increasing a need for the informal transport sector – minibuses, motorcycles, tricycles and taxis – to thrive.

¹ Panbody shack: A makeshift house made of corrugated metal or zinc sheets for the walls and roof.

Figure 2: Aerial view of Freetown from Leicester Peak

(Source: Azizat Gbadegesin)



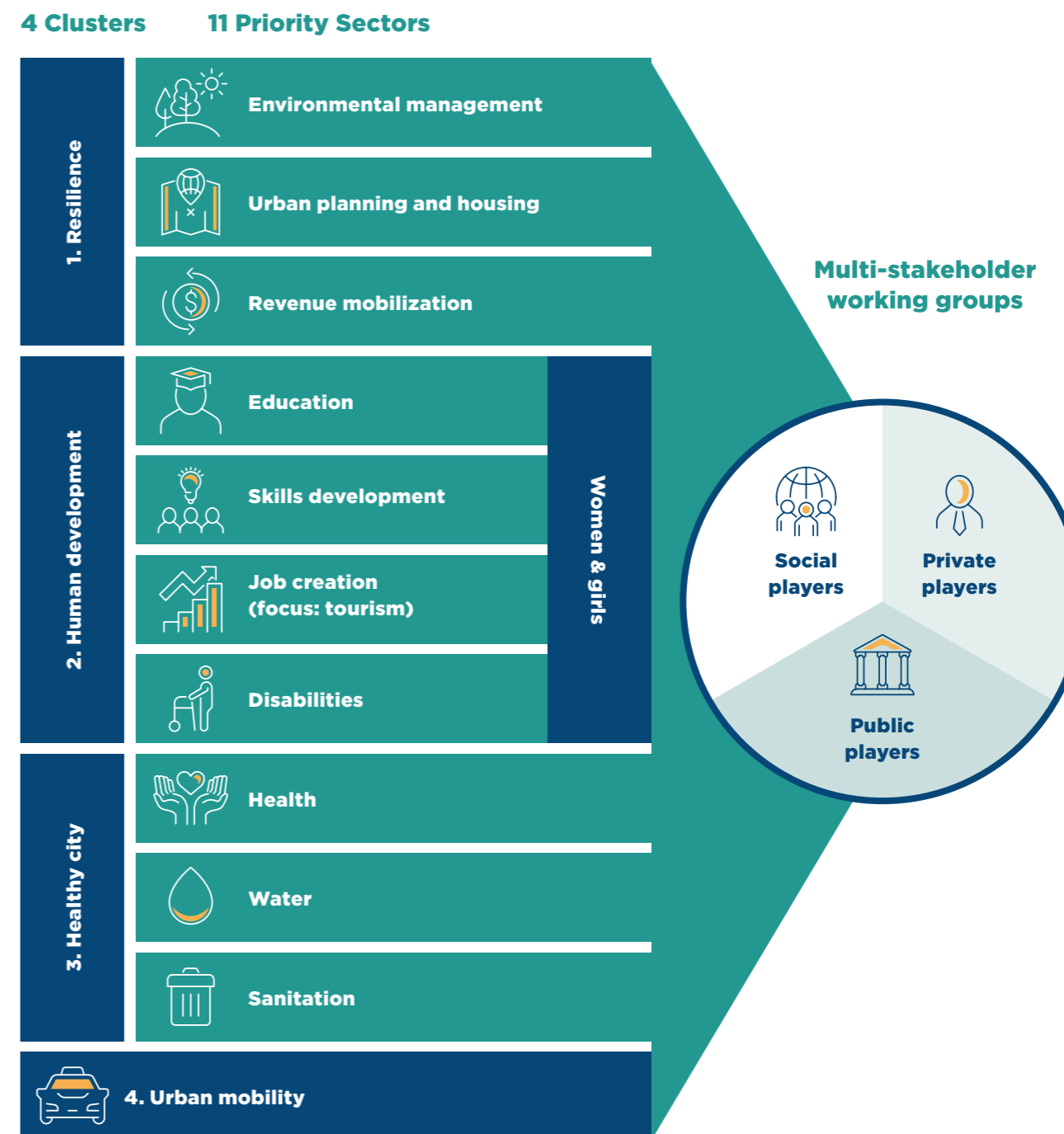
2.4 Administration and leadership

The City of Freetown is zonally divided into three regions: The East End of Freetown, Central Freetown, and the West End of Freetown, which are further subdivided into 48 wards. A Councillor heads each ward. The Freetown City Council (FCC) is chaired by a Mayor who is charged with the management of the city. Currently, this is Her Worship Yvonne Aki-Sawyer. In addition to the Mayor's leadership, the Department of the Freetown City Council (FCC) Administration, led by the Chief Administrator, ensures the efficient performance of all departments within the FCC. It is responsible for financial and resource management, as well as daily administration and coordination of other departments within the council. A summary of the organisational structure of FCC has been outlined in Annex A.

During her first tenure (May 2018-February 2023), the Mayor of the FCC, Her Worship, Mayor Yvonne Aki-Sawyer, put in place the Transform Freetown Agenda, which focuses on four clusters: Resilience, Human Development, Healthy Cities and Urban Mobility. These clusters cover 11 priority sectors: Environmental Management, Urban Planning and Housing, Revenue Mobilisation, Education, Skills Development, Job Creation, Disabilities, Health, Water and Sanitation, as shown in Figure 3.

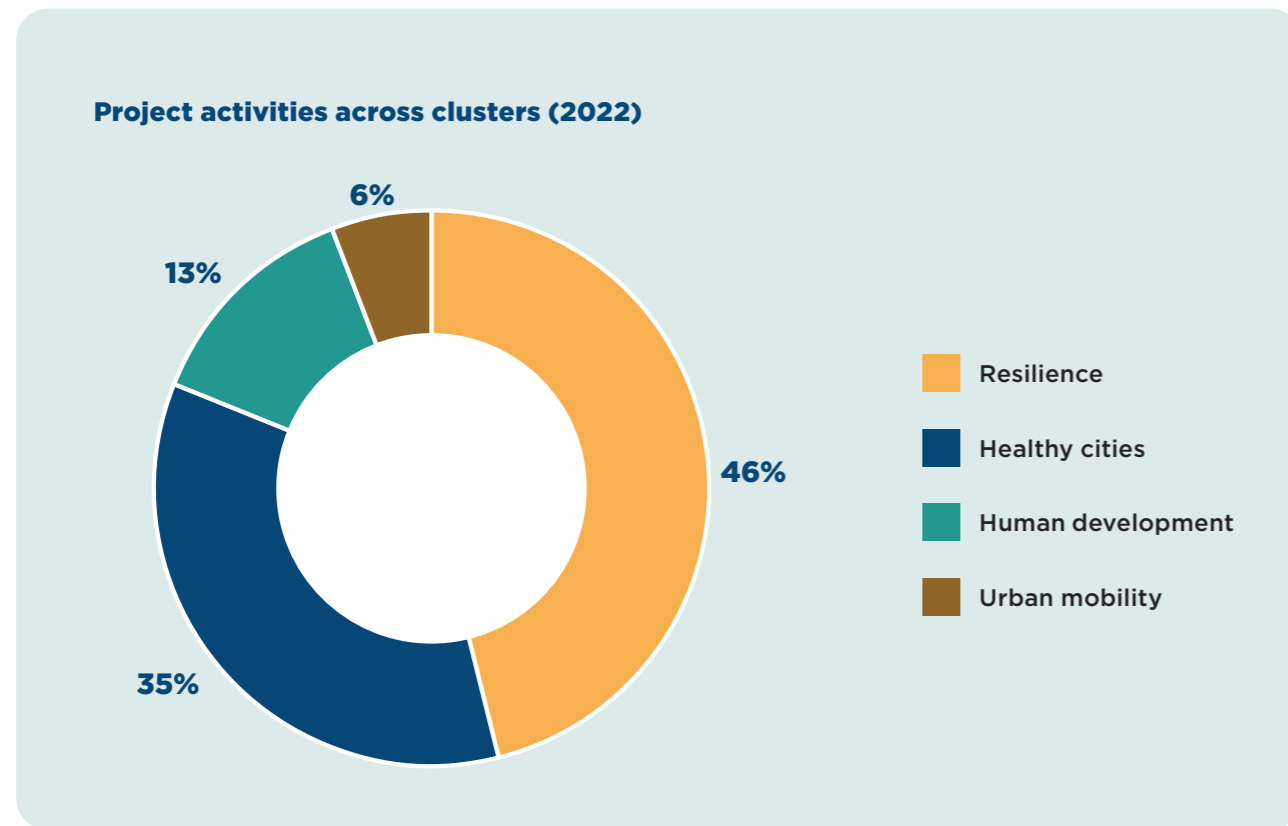
Figure 3: Clusters and Priority Sectors of the Transform Freetown Agenda

(Source: Transform Freetown Four Year Report January 2022 - January 2023)



In 2022, 46 project activities were delivered across these 4 clusters. As shown in Figure 4, 46% of the projects were for the Resilience cluster, 35% for the Healthy Cities cluster, 13% for the Human Development cluster and 6% for Urban Mobility. A few projects directly related to energy access are the waste-to-energy pilots at the Faecal Sludge Management Plant and the biodigester plant installed at the Aberdeen Women's Centre.

Figure 4: Project activities in 4 clusters of the Transform Freetown Agenda
(FCC, 2023)

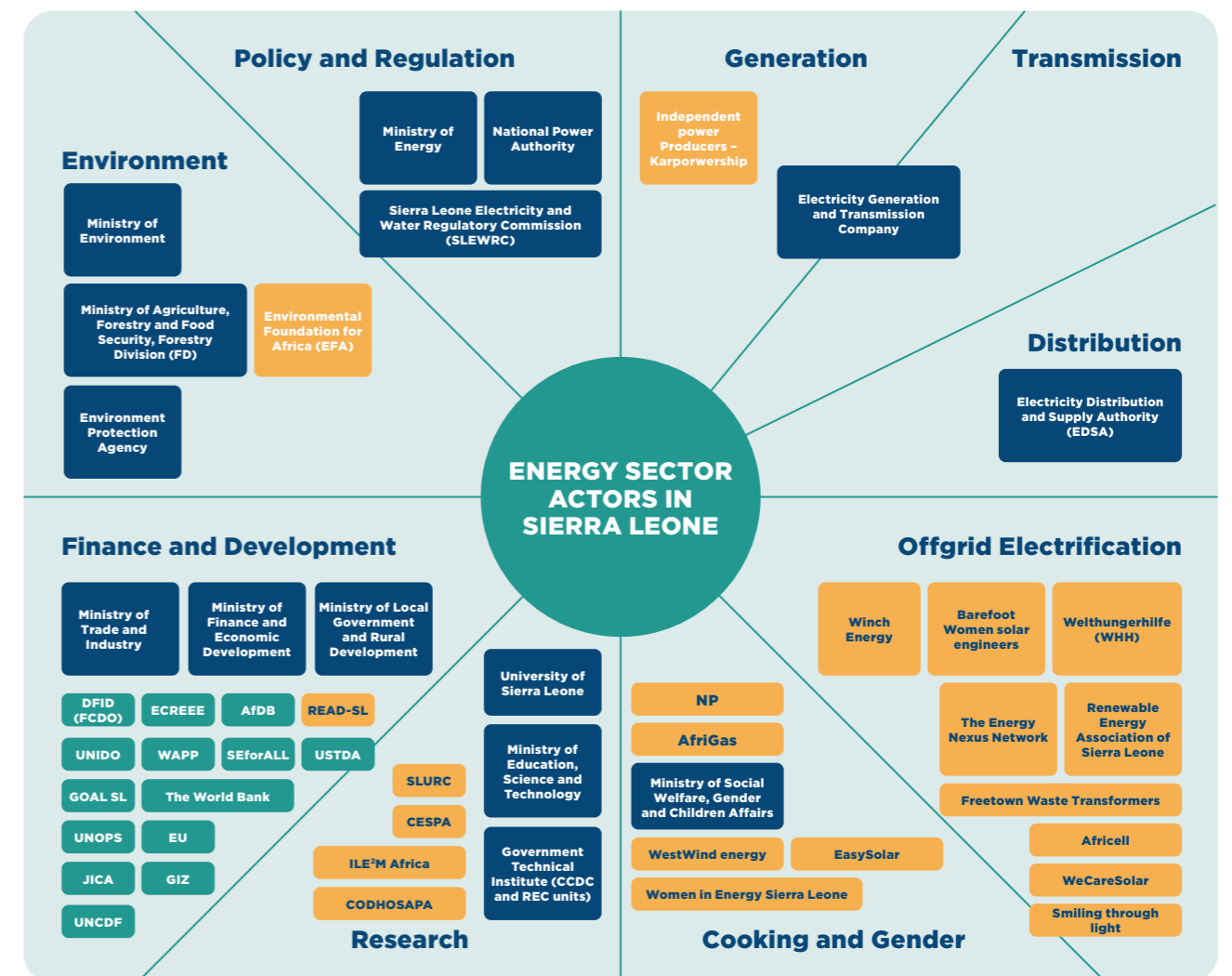


The Freetown Climate Action Strategy 2022-2030 was developed based on these prioritised sectors already considered in the Transform Freetown Agenda and launched in January 2023. The strategy identified many actions aimed at enhancing energy access, which include (i) cooperating with the GoSL on its plans to improve access to energy, increase energy efficiency and transition to cleaner fuels; (ii) working with the Electricity Distribution and Supply Authority (EDSA) on affordable and safer distribution of electricity in vulnerable communities to improve access to electricity rates, and (iii) generating energy from organic waste.

Energy sector actors

At the centre of Sierra Leone's energy landscape is the Ministry of Energy (MoE), which oversees the country's energy sector with strong support from other ministries, agencies, and departments. Each player presented in Figure 5 takes one or more roles relating to the generation, transmission or distribution of grid electricity, off-grid electrification, policy and regulation, environment, finance, research, and development.

Figure 5: Actors in Sierra Leone's energy sector



Key

- National government (public) institutions
- National private institutions
- International development organisations

Another major player in the energy sector is the Sierra Leone Electricity and Water Regulatory Commission (SLEWRC), which plays a significant role in regulating charges, tariffs, and licensing. The National Electricity Act, 2011 also established two important entities: the Electricity Generation and Transmission Company (EGTC) and the Electricity Distribution and Supply Authority (EDSA), whose major functions are the transmission and distribution of electricity, respectively. There is also a strong presence of the private sector and international and development partners supporting the country to increase its access to energy and meet Sustainable Development Goal (SDG) 7² and Sustainable Energy for All (SE4ALL) targets. The roles of each of these entities are captured in more detail in Table 1 below:

Table 1: Roles of actors in Sierra Leone’s energy sector

Entity	Role
The Electricity Generation and Transmission Company (EGTC)	<ul style="list-style-type: none"> Established by the National Electricity Act, 2011. Responsible for managing the country’s power generating stations and transmission lines. The company’s main function is generation, transmission and subsequent sale of electricity to the EDSA, subject to a power purchase agreement to be approved by the SLEWRC. It has the responsibility to (i) construct electricity generation stations, including hydroelectric schemes, (ii) execute business and projects generally associated with electricity generation and transmission, including the West Africa Power Pool, (iii) remain informed regarding the developments relating to the generation of electricity, (iv) advise the Minister on all matters relating to construction of infrastructure, generation and transmission of electricity and such other relevant duties.
The Electricity Distribution and Supply Authority (EDSA)	<ul style="list-style-type: none"> Established by the National Electricity Act, 2011. Responsible for managing the distribution networks and sale of electricity in the country. The Authority distributes, supplies, sells, purchases, imports and controls electricity, establishes uniform standard voltage throughout its area of supply, secures the supply of electricity at a reasonable price, and promotes and encourages the economical and efficient use of electricity, as well as related activities. The Authority purchases electricity through Power Purchase Agreements (PPAs) approved by the Commission and supplies to users, subject to contract on terms set by the Authority
The Directorate of Energy (DoE)	<ul style="list-style-type: none"> The DoE, under the MoE, was established in 2010. The DoE was set up to conduct strategic planning on energy security and access issues and was mandated to introduce and ensure efficient utilisation of new energy sources.
The Renewable Energy and Energy Efficiency & The Rural Electrification unit	<ul style="list-style-type: none"> Formed by the Directorate of Energy in 2012. The units are responsible for organising and conducting research and development in renewable energy (RE), energy efficiency (EE) and rural electrification.

² Target 7.1: By 2030, ensure universal access to affordable, reliable and modern energy services.
 Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix.
 Target 7.3: By 2030, double the global rate of improvement in energy efficiency.

Entity	Role
Electricity and Water Regulatory Commission	<ul style="list-style-type: none"> Established by the SLEWRC Act of 2011. Includes a combination of private and public parties from the Institution of Engineers, the Labour Congress, the Sierra Leone Protection Agency, and four other persons appointed by the President. Responsible for regulating the management and operations of the EGTC and the EDSA. Regulates the provision of electricity and water services. Power to regulate rates and charges for licensing and related matters Issuing, renewing, amending, and revoking licenses, registering and monitoring.
The Petroleum Directorate	<ul style="list-style-type: none"> The Petroleum Directorate (under the MoE) is responsible for monitoring the petroleum operations under the Act.
Ministry of Finance and Economic Development	<ul style="list-style-type: none"> Responsible for the provision of financial support needed to manage the MoE’s administration and programmes. It is involved in the pricing of petroleum products, particularly for the transport sector, which represents a significant revenue stream for the national budget.
Environmental Protection Agency (EPA)	<ul style="list-style-type: none"> EPA is responsible for ensuring that environmental impact assessment measures are conducted, and resulting measures are implemented, for energy-related programmes. The EPA works closely with MoE in the design of Global Environment Facility (GEF) funded projects and works to enhance its capacity in the coordination and networking of clean technology, as well as to develop a baseline data inventory monitoring system.
Ministry of Trade and Industry	<ul style="list-style-type: none"> Oversees upstream and downstream activities on petroleum resources, including their exploration and marketing, and is responsible for ensuring the quality of service and safety standards within the petroleum sector.
Ministry of Agriculture, Forestry and Food Security, Forestry Division (FD)	<ul style="list-style-type: none"> Plays a leading role in the fuelwood sector, both in terms of policy formulation and regulation. Holds a key role in matters related to bioenergy and crop-related energy issues. Responsible for promoting micro-nursery and community forestry through tree replanting and farmer-managed agroforestry to ensure a sustainable supply of renewable biomass to alleviate the pressure on natural forests.
Ministry of Social Welfare, Gender and Children Affairs	<ul style="list-style-type: none"> Responsible for coordinating gender and children issues relating to energy use.
Ministry of Local Government and Rural Development	<ul style="list-style-type: none"> Responsible for supporting rural electrification programmes and coordinating, implementing and evaluating energy projects. The present decentralisation of the Government’s functions creates opportunities for the governance of energy services in decentralised entities/programs.
Ministry of Education, Science and Technology	<ul style="list-style-type: none"> Responsible for supervising the institutions handling energy-related programmes, such as training, research, and development.
Ministry of Transport and Aviation	<ul style="list-style-type: none"> Responsible for coordinating energy use in the transport sector.
Government Technical Institute, Renewable Energy Centre (REC), Freetown	<ul style="list-style-type: none"> The centre accrued experience in implementing solar, hydro, and biogas technology and in training personnel. The institute is partnering with MoE and ECOWAS Centre Renewable Energy and Energy Efficiency (ECREEE) on RE and EE projects in an initiative to strengthen the technical and financial capacity of the REC, as well as to explore the potential of transforming REC into a Centre of Excellence in RE.

Entity	Role
Bilateral/ Multilateral partners	<ul style="list-style-type: none"> Organisations such as the African Development Bank (AfDB), Energising Development (EnDev), European Union (EU), Department for International Development (DFID), GIZ, Japan International Cooperation Agency (JICA), UN agencies (United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Office for Project Services (UNOPS)), U.S. Agency for International Development (USAID), and World Bank assist the GoSL with its energy programmes, through institutional strengthening, project development, funding and public-private partnerships.
ECOWAS Centre Renewable Energy and Energy Efficiency, Cape Verde (ECREEE)	<ul style="list-style-type: none"> ECREEE is working towards enhancing the regulatory, financial, and technical capacity of the MoE in formulating RE and EE policies, action plans, and SE4ALL action agendas. WACCA, through ECREEE, is also supporting the MoE in developing and harmonising standards for off-grid technologies and cookstoves, as well as standards and labels for appliances.
Environmental Foundation of Africa (EFA)	<ul style="list-style-type: none"> EFA is an NGO that works closely with the MoE on renewable energy and rural electrification programmes. EFA conducted a household energy usage survey as part of the EU-funded project titled, "Renewable Energy Empowerment in Rural Sierra Leone: A Vision to Electrify Rural Sierra Leone." A new energy training centre is being built in Freetown.
EU Energy Initiative Partnership Dialogue Facility (EUEI-PDF)	<ul style="list-style-type: none"> EUEI-PDF, in collaboration with the MoEn, is currently formulating a Household Cooking Energy Plan, which will form an essential first preparatory step in the development of a comprehensive Household Cooking Energy Plan for Sierra Leone and will build on the scoping study conducted by EUEI-PDF in 2011 with the MoE.
Welthungerhilfe (WHH)	<ul style="list-style-type: none"> WHH is responsible for installing a 20 kW hybrid system (solar PV and pico hydro) at River no. 2 Beach in the Freetown Peninsula Area.
Energy for Opportunity (EFO)	<ul style="list-style-type: none"> EFO is a national NGO established in 2005 that is currently working on energy, sanitation, clean water, health promotion, and agriculture in six of the country's districts. EFO has extensive experience in community mobilisation, battery charging, clean water projects, and community energy projects, including carrying out fuelwood trade, energy assessments and surveys, solar capacity design, installation and training.
Smiling Through Light	<ul style="list-style-type: none"> It is a social enterprise that works with a network of women to provide clean, reliable and sustainable energy in Sierra Leone. With offices in Freetown, Lunsar, Tombo and Kamakwie, the company recruits local women and trains them to become solar technology entrepreneurs. These women sell solar-powered lamps within their communities. The company created 15 local jobs and sold approximately 700 solar products in 2019 alone (SEforALL, 2019).
Barefoot Women Solar Engineers Association of Sierra Leone	<ul style="list-style-type: none"> Responsible for training women in installing and maintaining solar PVs in rural communities.
Freetown Waste Transformers	<ul style="list-style-type: none"> The company develops containerised waste-to-energy systems that generate energy on-site from organic waste for use on-site as electricity, biogas, heat and/or manure for farmlands.
Renewable Energy Association Sierra Leone (REASL)	<ul style="list-style-type: none"> The REASL is a trade association that partners with government and donors to accelerate the uptake of renewable energy through a market-based approach. »

Entity	Role
Other NGOs and private sector players³	<ol style="list-style-type: none"> i. Centre for Accountability and Rule of Law (CARL) ii. Centre of Dialogue on Human Settlement and Poverty Alleviation (CODHSAPA) iii. Christian Aid iv. Concern Worldwide v. Conservation Society of Sierra Leone (CSSL) vi. Environmental Forum for Action (ENFORAC) vii. Environmental Foundation for Africa Sierra Leone viii. Forum for African Women Educationalists (FAWE) ix. Focus 1000 x. GOAL Sierra Leone (GOAL SL) xi. Health for All Coalition Sierra Leone xii. Institute for Leadership and Environmental Management (ILE²M Africa) xiii. Trócaire xiv. Teranga stoves xv. The Energy Nexus Network (TENN) xvi. Women in Energy Sierra Leone xvii. Afrigas

³ This list of organisations was one of the outcomes of the group discussions during the ENACT MLG dialogue workshop in Freetown (May 2023). In addition are a few names from the Summary Notes of the National Stakeholder Consultative Workshop on Clean Cooking (September 21 2023) organised by the World Bank.

Policy and regulatory framework

The electricity sector in Sierra Leone is governed by the MoE, which formulates policies and programmes for the sector and provides oversight functions for all agencies and actors across the entire energy supply chain. The enactment of relevant legislative reforms laid the foundation for restructuring the sector. This includes the National Electricity Act, 2011, which created the EWRC with the power to regulate all utility service providers in both the electricity and water sectors. The same Act unbundled the former National Power Authority (NPA) into the EGTC and the EDSA.

Sierra Leone has also put in place several policies and regulations for the country's energy landscape, which cover areas such as market and regulations, energy access and affordability, RE promotion, fossil fuel regulation, infrastructure and grid development, environment and climate change, international cooperation and trade, social and economic policies, and research and development. These policies are presented in Table 2. It should, however, be noted that the Freetown City Council has no mandate in electricity supply as this is not included under the functions devolved to local councils.

Table 2: List of policies on the implementation of renewable energy, electricity and clean cooking options in Sierra Leone

Policy, strategy & action plan	Description	Targets
Cleaner Cooking Energy Compact, 2021	<ul style="list-style-type: none"> Was formulated to affirm the commitment of the GoSL to address traditional cooking practices, and seek support to invest in cleaner cooking options and improve the cooking sector by providing alternatives. 	<ul style="list-style-type: none"> Increase the use of liquefied petroleum gas (LPG) to 25% by 2030, and for all households to have access to energy-saving cooking solutions. »

Policy, strategy & action plan	Description	Targets
National Energy Policy and Strategic Plan, 2020	<ul style="list-style-type: none"> Outlines a strategy for implementing energy policy on rural electrification and prioritises off-grid solar systems to meet energy needs in rural areas. Aims to achieve 1.7 million rural dwellers having access to energy by 2030 by improving governance of the energy sector and facilitating flow-cost energy projects in all districts. Recommends incentives for homeowners who install energy-efficient appliances for lighting (including for cooking). Offers incentives for importers and producers to deal in energy-efficient appliances and provides credits for companies who produce energy-efficient appliances, including cooking. 	<ul style="list-style-type: none"> Improve access to LPG in urban households from 10% in 2015 to 40% in 2023 and 50% by 2030. Improve access to improved cookstoves from 23% in 2015 to 50% in 2023 and 75% by 2030.
National Cooking Energy Action Plan (NCEAP), 2020	<ul style="list-style-type: none"> Focuses on producing wood fuel sustainably and making wood fuel consumption more efficient, as well as, increasing the use of LPG as an alternative to wood fuel for cooking, and scaling-up the use of biogas and agri-residues as an alternative to firewood for rural (including slum) communities. 	<ul style="list-style-type: none"> Reduce the use of biomass – charcoal to 60% and firewood to 80% by 2030.
2019 Sierra Leone Electricity and Water Regulation Commission (SLEWRC) Mini-Grid Regulations, 2019	<ul style="list-style-type: none"> Focuses on licensing, electricity meters and mini-grid interconnection rules. Includes specific guidelines for the safety of biogas equipment. 	<ul style="list-style-type: none"> To regulate the activities of licensees, developers, operators and users of the mini-grids as well as all other private or public stakeholders, including main-grid utilities or any institution or agency that interacts with mini-grid developers, basic or full mini-grid licensees and/or mini-grid consumers in Sierra Leone.
National Electrification Strategy Analysis, 2018	<ul style="list-style-type: none"> Makes provision for community involvement by involving local/slum and rural communities in promoting electrification use (which includes lighting and cooking). Setting rural electrification committee meetings in advance of electrification to assess demand and needs. 	<ul style="list-style-type: none"> To ensure 37% of the rural population (including slums) access to renewable energy by 2030.
Bioenergy Policy, 2017	<ul style="list-style-type: none"> Create an enabling framework to access clean and modern energy cooking services for increased productivity, wealth creation and improved quality of life for all Sierra Leoneans by ensuring energy security and reducing over-dependence on imported oil. 	<ul style="list-style-type: none"> Increase LPG penetration from 0.99% to 20% by 2030 and biofuel from 0.2% to 20% by 2035.
Energy Africa Policy Act, 2016	<ul style="list-style-type: none"> Sierra Leone became the first African country to sign the Energy Africa Policy Compact and launched an “Energy Revolution” to increase access to renewable energy in the country to 80% by 2030, with strands on cooking energy. 	N/A »

Energy access in Sierra Leone and Freetown

5.1 Energy access in Sierra Leone

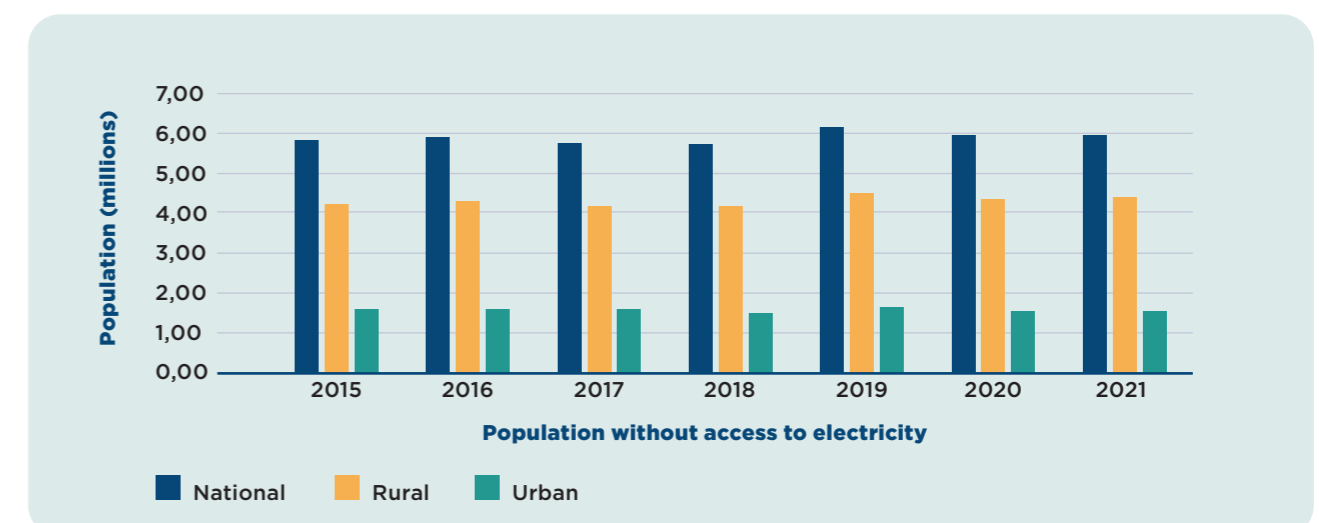
Like in many other countries, Sierra Leone's electricity network is a centralised grid. Electricity generation is primarily from hydropower (42.8%) (UNEP, 2015) and thermal power plants, which is delivered through the transmission network. The national transmission system consists of a 161 kilovolts (kV) transmission line extending from the Bumbuna hydroelectric plant to the Freetown substation, as well as an electricity grid for the town of Makeni and a 33 kV transmission line from Bo to Kenema. The EGTC manages the generation plants and transmission network. Electricity is transmitted via high-voltage transmission lines to distribution stations managed by the EDSA.

In 2021, only about 26% of all households in Sierra Leone were connected to the main grid, thus leaving about 5.95 million people still without access to electricity, as shown in Figure 6. Nearly all these electrified households are either in Freetown and its neighbourhoods or in some of the other cities of Bo, Kenema and Makeni. Similarly, the 2018 Sierra Leone Integrated Household Survey (SLIHS 2018) indicated that 70% of households in the Western Area (where Freetown is located) had access to electricity. The Multiple Indicator Cluster Survey (MICS) (Institute for Health Metrics and Evaluation, 2017) also found that 66% of households in Western Area Rural and 47% of households in Freetown used a battery-powered torch as their main source of energy for lighting (Statistics Sierra Leone, 2018).

Policy, strategy & action plan	Description	Targets
National Energy Efficiency Policy, 2016	<ul style="list-style-type: none"> The Energy Efficiency Policy (EEP) focuses on removing obstacles that have constrained the promotion and implementation of energy efficiency and conservation measures. The policy measures required to achieve this goal comprise fiscal incentives, awareness creation, institutional and human resource capacity development and financial intermediation. 	N/A
National Renewable Energy Action Plan, 2015-2030	<ul style="list-style-type: none"> The plan addresses the needs of the electricity supply industry. It is designed to pave the way for RE policies, legislation and regulations that support RE in the national energy mix, promote investment and ensure effective collaboration among players in the RE sector. 	<ul style="list-style-type: none"> 1,229 MW of RE installed, with RE being 65.3% of the electricity mix by 2030. 75% of population using ICS, 36% of charcoal production by efficient methods and 25% of population with access to modern cooking.
SE4All Country Action Agenda, 2015	<ul style="list-style-type: none"> Sets objectives and strategies for renewable energy development and energy efficiency. 	<ul style="list-style-type: none"> Increasing energy access to 92% by 2030.
ECREEE Renewable Energy Policy (including Sierra Leone) 2013	<ul style="list-style-type: none"> Sets regional targets for renewable energy development (e.g., promoting 60,000 mini-grids and 2.6 million stand-alone systems across the region by 2020 for €13.6 billion. 	<ul style="list-style-type: none"> To serve 71.4 million people in West Africa.
National Electricity Act, 2011	<ul style="list-style-type: none"> Act to incorporate the EGTC, establish the EDSA, and provide for other related matters. 	N/A

Figure 6: Sierra Leonean population without access to electricity

(Africa Energy Portal, n.d.)



The Sierra Leonean grid reports technical issues like instability and unreliability. This instability is evident in the voltage fluctuations and power surges, which cause damage to distribution network equipment and household appliances. However, since June 2018, the grid supply has improved to an average of 18 hours per day, although supply interruptions are frequent due to planned and unplanned outages of generators, transmission lines and distribution networks (Japan International Cooperation Agency (JICA), 2009).

As there is still a net power deficit (about 400 MW) (Sinalda, 2021), with the smaller population with access to grid-supplied electricity still experiencing an unreliable and unstable electricity supply, the country needs additional sources to meet its demand and improve access. The difficulty in accessing electricity is compounded by significant transmission and distribution network problems, which resulted in about 45% loss in electricity generated (The Netherlands Enterprise Agency, 2018), while additional losses through illegal connections contribute to revenue loss for the EDSA. Though prepaid meters are a more efficient revenue collection approach for the utility, they are more common within higher-income households (who typically have better access to electricity) than in low-income areas and informal settlements, where illegal connections and multiple households connected to one prepaid meter are common. In the press statement of Tuesday, 7 March 2023, the Director General of the EDSA, Mr Abu Kamara, indicated that the company loses over 7 billion (old) Leones (\$350,000)⁴ monthly due to electricity theft and vandalism of their properties, which is a major hindrance to their efforts to improve access to electricity. He noted, "If we are to keep providing power supply to the people of Sierra Leone, we all have a role to play in ensuring that we stop illegal extraction of electricity" (Awoko Publications, 2023). This, coupled with limited generation capacity, seasonal variations for hydropower production and ageing transmission and distribution networks, affects adequate nationwide electricity coverage, reliability, and expansion.

In addition to the challenges presented earlier, it is worth noting that the government sometimes struggles to pay debts owed to Karpowership⁵, leading to the switching off of supply. *The Sierra Leone Telegraph*, on its publication of Thursday, 21 September 2023, reported that the Minister of Energy, Hon. Alhaji Kanja Sesay, informed the public that the Government of Sierra Leone owes the Turkish Karpowership about \$40 million as outstanding debt for generating energy for Freetown (Reuters, 2023), hence the periodic power outages. This considerable debt build-up for electricity, which the government must pay, affects other sectors, especially free quality education and free health care, which form the government's flagship projects. However, opportunities related to the growing appetite for alternative options and the willingness to accept new initiatives, including renewable energy, are now widely promoted by donor institutions in the country.

Regardless of the many challenges, the government has demonstrated a strong commitment to increasing energy supply through the enactment of the Electricity Sector Reform Roadmap (ESRR) (2017-2030) and the Sierra Leone Sustainable Energy for All (SEforALL) Country Action Agenda (2015). In addition, the Côte d'Ivoire-Liberia-Sierra Leone-Guinea (CLSG) interconnector project⁶, under the West African Power Pool (WAPP) program, is already providing an increased supply of electricity to enable Freetown and a few cities (particularly Kenema and Bo) in the provinces to meet the growing energy demand.

⁴ Using an exchange rate of 1 SLL=0.515 USD for February 2023

⁵ Karpowership: A company specialised in deploying floating electricity generation stations powered by natural gas, heavy fuel oil, or liquefied natural gas (LNG), and designed to provide base load or peak shaving to meet electricity demand.

⁶ The CLSG project is a project by the West African Power Pool to improve energy access and security within the 4 nations, mainly through construction of a high voltage network as well as other activities. It will enable energy trading, promote economic growth and facilitate development within the West African sub-region.

5.2 Energy access in Freetown

Freetown is supplied with electricity by four power stations: a 40 MW hydropower plant (Bumbuna), 16.5 MW and 10 MW thermal power plants (at Blackhall Road and Kingtom) and 16 MW from Addax Bioenergy (AfDB, 2011). Since 2018/2019, electricity has been supplied to the City through the Turkish Karpowership, a company contracted by EDSA, the MoE and the Ministry of Finance until 2025 to supply 63 MW during the dry season and 23 MW during the wet season (Reuters, 2020). Freetown's distribution network has a maximum capacity of about 85 MW, which is still inadequate to deliver all the available generation capacity in the rainy season. The isolated grids operated by EDSA are mostly powered by expensive heavy fuel oils (HFO)/diesel units, which suffer from frequent fuel shortages. Nearly 1,000 km of low voltage (LV) lines/cables are dilapidated, leading to high technical losses and low system reliability. In 2009, a Japanese study attributed huge energy losses to the disorderly and dangerous ways the low voltage distribution lines were installed, often with little or no recourse to any design standards, as well as because of the widespread illegal connections (Japan International Cooperation Agency (JICA), 2009). The use of diesel generators as an alternative power supply by factories, businesses and residences during outages is also common within Freetown.

Nevertheless, the electricity supply situation keeps developing rapidly to improve overall access in Freetown and the rest of the country. Solar mini-grids have started being marketed and are installed in some streets and health facilities. However, they are largely inaccessible for most residents due to the high initial capital and installation cost requirements. While these are essential to the daily lives of people in Freetown, grid-connected energy is the main source for powering lighting and appliances in most homes.



Source: Carine Buma

Like the rest of Sierra Leone, energy consumption for cooking in Freetown is dominated by biomass, with over 99% of households cooking with fuelwood or charcoal. A major portion of the biomass for cooking comes from the provinces nearby and is transported into Freetown daily⁷. A feasibility/baseline assessment of one of Freetown’s informal settlements (Susan’s Bay) was conducted by Afrigas SL, ILEM-Africa and PayGas in 2022 via the ENACT project. It was observed that energy for cooking is via four sources, namely firewood which is estimated at 72%; charcoal at 27%; LPG at 0.99%; and animal waste/biogas at 0.2%. This is the first indication of the gap in access to clean cooking fuels and technologies within the city’s informal settlements.

5.3 Impacts of the current energy access scenario in Freetown



A common situation is that youths, particularly those in informal settlements who do not have stable electricity (through grid supply or generators), are at a disadvantage since, in the absence of electricity, they cannot use bulbs, appliances or machines needed for work and study.



The lack of electricity also limits the capacity to preserve food. Without reliable food storage, larger volumes of food become spoiled, affecting the health of consumers and the sellers’ income and generating more waste in landfills. Besides, food prices normally rise with increasing energy costs (for example, to cover additional electricity generation for cold rooms and freezers or additional charcoal or wood commonly used in Freetown to preserve fish through smoking). This indirectly increases household expenses on food.



Another critical sector impacted by energy supply is the health sector. Health facilities require energy to power equipment, store vaccines, sterilise instruments and function, especially during emergencies, such as deliveries at night. Lack of power was a major constraint during the Ebola pandemic, prompting solar power installation in many Peripheral Health Units (PHUs). SEforALL recently installed solar PV and battery storage systems in two hospitals in Freetown⁸ to improve the reliability of electricity, reduce GHG emissions from diesel generators and reduce hospital energy bills.



The lack of energy access also has a social impact. Though Freetown is generally considered relatively safe, an increased presence of streetlighting would create a less enabling environment for night-time crimes, especially in densely populated urban areas. In these densely populated urban areas and informal settlements, energy use could also be a source of fire risk through illegal electricity connections and faulty electric wiring, inappropriate storage of flammable fuels such as petrol, using candles and kerosene lamps for lighting, or open fires while using wood or charcoal for cooking – as reported in the case of the 2017 fire in Susan’s Bay community (Di Marino et al., 2018).

⁷ This was indicated by participants at the ENACT workshop on Clean cooking (May 2023)

⁸ Following the energy audits conducted across hospitals in Sierra Leone under the ‘Sierra Leone Healthcare Electrification Project’ by SEforALL, the Ola During Children’s Hospital and Princess Christian Maternity Hospital in Freetown were selected. The implementation was completed in January 2024.

5.4 Energy prices in Freetown

Energy prices can fluctuate based on factors such as fuel costs, government policies, currency exchange rates, and economic conditions. The SLEWRC determines electricity tariffs in Sierra Leone, which differ according to consumer classes. A recent increase in electricity prices from tariffs that were previously effective 1 July 2022 was approved by SLEWRC in September 2023 and effective by 1 October 2023 (see Annex B). The increase ranged from 66% for customers in the T1 Normal band to 110% for those in the T2 Commercial band and 121% for those in the T3 Institutions band.

Other energy sources within the city have their prices determined by a range of factors such as by the retailers (as in the case of charcoal and firewood), or the exchange rate of the Leones (SLL) to the dollar (USD) (as in the case of LPG). Indicative prices of fuel within Freetown as at September 2023 are presented in Table 3:

Table 3: Energy prices in Freetown

Source: ILEM-Africa (September 2023)

Fuel type	Average prices of fuels	Units
Petrol	30.00	SLL per litre
Diesel	30.00	SLL per litre
Kerosene	30.00	SLL per litre
LPG	230.00	SLL per 6kg refill
Firewood	10.00	SLL per bundle of 12 mangrove pieces
Charcoal	5.00	SLL per kg
Electricity	1.81-5.86 ⁹	SLL per kWh

A 2017 survey (Adam Smith International, 2017) indicated that households across Sierra Leone were willing to pay, on average, up to 1.235 SLL (1,235 old Leones) per kWh of electricity, giving a monthly average electricity bill of about 109 SLL (109,000 old Leones).

⁹ The Unit price per kWh varies depending on the consumer class (see Annex B)

5.4 Programmatic Interventions in the clean cooking space

In an effort to provide alternative cooking energy options to the use of biomass, there are already several ongoing national programme interventions as outlined in Table 4:

Table 4: List of programme interventions addressing clean cooking energy access in Sierra Leone

Programme Interventions	Year	Purpose and Recommended Actions	Target
ECREEE - Capacity building for entrepreneurs on production and dissemination of improved cookstoves in Sierra Leone	2022 - 2023	Training of entrepreneurs on local production of improved cookstoves to promote local manufacturing of clean cookstoves, establish and support new businesses, create local employment, and strengthen the capacity of public and private sector players.	50 participants trained over two sessions.
National Tree Planting Project	2021	In an effort to respond to policy commitment Cluster 7 of the Medium-Term National Development Plan (MTNDP 2019-2023) seeking to address the national environmental resilience, the Ministry of Environment is working with local services providers to establish "Community Forest Management Committees in all five regions of the country to mitigate climate change effects due to deforestation for human settlement and charcoal for cooking.	The aim was to plant 5.5 million trees by 2023 ¹⁰ .
FCC Tree Planting Project	2019	As part of the Transform Freetown Campaign, the Mayor of Freetown and her administration are working with the key ministries, departments and agencies (MDAs), development partners and local communities on a tree (mangrove) planting project to address the recurring climate change impact in Freetown, and its slum communities (like Susan's Bay).	Plant one million trees across 13 catchment areas and slopes, and restore the natural ecosystem by 50% by 2022 ¹¹ .
Energy Efficient Charcoal and Cookstove	2017	Through support from UNDP, \$1.9 million was provided to implement an "Energy Efficient Charcoal and Cookstove Project", which seeks to address deforestation by introducing sustainable charcoal production.	Save 40 hectares of woodlots for cooking.

¹⁰ According to the Assessment report on National Tree Planting and Reforestation Project by the National Monitoring and Evaluation Directorate, 1,106,000 seedlings were delivered to farmers and 11.7% by the Ministry (see: <https://named.gov.sl/wp-content/uploads/2022/01/NaMED-Final-Monitoring-Report-tree-planting-Final.pdf>)

¹¹ According to the Transform Freetown Four Year Report (January 2022-January 2023), 66% of the trees had been planted by 2022, and the aim is to have reached the 1 million mark by the end of 2023.

Upstream policies and efforts towards implementing downstream programmes with defined targets on energy access, clean cooking and environmental management in Sierra Leone indicate that there is strong political will to transition the cooking energy sector from the use of biomass (firewood and charcoal) to cleaner and sustainable alternatives such as improved cookstoves, bioenergy and LPG. Supported by ECREEE, UNDP, EU, World Bank, and GIZ-EnDev, these efforts demonstrate a political will and programmatic strengthening at the national level to reform the cooking energy sector. One of these is the "Cleaner Cooking Energy Compact", formulated by the MoE with support from GIZ-EnDev, and submitted to the UN High-Level Energy Panel in September 2021. It serves as a blueprint to address biomass cooking practices in Sierra Leone. However, resources have yet to be mobilised to implement the designed project activities. It is envisaged that in due course, these efforts will surely provide a framework for partnership in implementing a clean cooking energy project in Freetown and other cities.



Source: Afrigas

Renewable energy resource potential

Sierra Leone has various forms of renewable energy resource potential, including hydro, solar, and biomass (from agricultural waste), which can be exploited to meet its growing energy demand. According to the Renewable Energy Statistics 2023 report (IRENA, 2023), Sierra Leone had its total electricity from RE sources increase over the years from a capacity of 55 MW in 2013 to 104 MW in 2022. Of this 104 MW, 61 MW is from hydro, 9 MW is from solar, and 34 MW is from bioenergy. An additional 10 MW from the Makoth solar plant was added in October 2023 to increase power supply to the Western area. In Freetown specifically, there is a solar PV power potential of about 1,424 kWh/kWp per year (with a higher potential of about 1,600 kWh/kWp in the northern areas like Bindi, Kabala and Bendugu), as shown in Figure 7.

Wind power is also available onshore and offshore along the coast. The average speed in Freetown is about 3-4 m/s at 50 m above sea level. However, at the time of compiling this report, no wind power projects were installed in Freetown (and the rest of Sierra Leone). Five wind turbines were being considered as part of the Sherbro Island project. This construction will be the first wind park in Sierra Leone (Markosyan, 2023).

Regarding bio-energy resources, Freetown City Council has currently partnered with the Freetown Waste Transformers on a waste-to-energy project to generate electricity from municipal food waste to power the Aberdeen Women's Centre. A network of 40 small-scale (50-100 kW), containerised waste-to-energy digesters will be run by local entrepreneurs in Freetown as part of this project (The Waste Transformers, 2023). There is also a faecal sludge treatment plant managed by GOAL SL in Kingtom, which processes faecal matter brought in from the city into compost, biogas and briquettes, as shown in Figure 8.

The theoretical hydropower potential (HPP) for Sierra Leone is estimated to be 4,381 MW (reference period 1998-2014), which is the total for all rivers in the country. The total of rivers with attractive theoretical potential for pico/micro/mini, small, or medium/large HPP is 3,787 MW (ECREEE, 2017). Hydropower, which supplies 60-70% of energy, is, however, being impacted by climate change as precipitation levels become less predictable and, therefore, more difficult to manage (Government of Sierra Leone, 2021). Thus, climate change policies that consider access to resilient and sustainable energy must be focused, to ensure a sustainable hydropower supply.

Figure 7: Solar photovoltaic power potential for Sierra Leone
(World Bank Group, 2017)

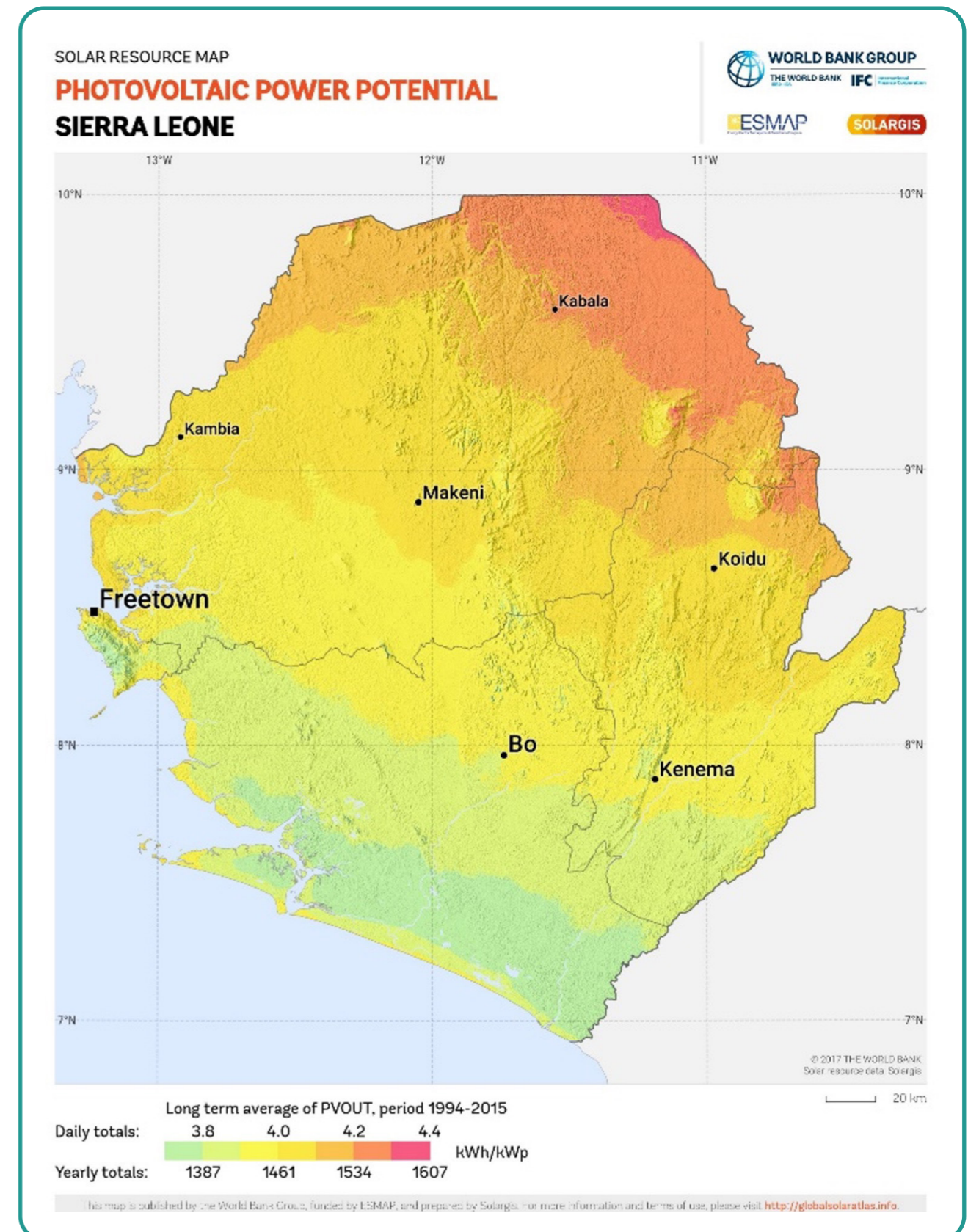


Figure 8:
(a) Faecal sludge treatment facility managed by GOAL SL and
(b) briquettes from treated sludge



Though solar, hydropower and biomass resources are abundant, they remain underutilised. While solar PV systems and mini-grids are seen as a popular solution by NGOs and the authorities, they are not readily available to most households and communities for two reasons. Firstly, buying and installing solar PV systems is expensive and out of reach for most of the population. Secondly, large solar products are not easy to maintain or repair due to high costs and limited technical skills available in the area. No data is readily available on how many solar mini-grids are in Freetown or the Western Area, though some Freetown streets are lit using solar streetlights.

In addition to these renewable energy sources, another untapped resource potential is energy efficiency, which is often regarded as the Fifth Fuel. A study on energy efficiency (Kamara, 2020) indicated that implementing energy-efficient practices based on behavioural patterns by residents within Freetown would save electricity. Although national policies promoting energy efficiency exist, projects to support this at the national or local level were not readily available at the time of preparing this report.

Within Freetown, about 24 organisations in the private sector are members of the Renewable Energy Association of Sierra Leone (Renewable Energy Association of Sierra Leone, 2022). These organisations provide a range of products and services cutting across solar PV systems and clean cooking technologies and play a pivotal role in promoting the deployment of renewables in the city and country to improve energy access.

Energy financing landscape in Sierra Leone and Freetown

Energy as a service and a business needs to be paid for so that the government and/or investors can sustain the provision of services and get payback on their investment. The unwillingness of individuals/households to pay tariffs with a preference for illegal connections causes severe financial losses to EDSA and significant consequences for other sectors of public spending – health, education, and water. Also, the low availability of financing for private investments, economic incentives, and microfinance for small-scale solar businesses is limiting further development of existing infrastructure and the growth and viability of alternative energy sources.

Sierra Leone receives around \$700 million annually in official development assistance (ODA); around 60% is bilateral aid.¹² During the last seven years (2017-2023), the one of the largest project supported by the donor community for on-grid electrification is the Sierra Leone segment of the CLSG transmission line along with the electrification of some communities beside the transmission corridor, which is jointly financed by the African Development Bank (AfDB), European Investment Bank (EIB), KfW Development Bank and World Bank. The project implementation will help complete the WAPP interconnection network and enhance power supply security by 290 MW. The CLSG interconnection line at Teloma, connecting the south and east of Sierra Leone, has been powered (Ganie, 2022), and further project activities in December 2023 across the region will include capacity building. The JICA, IDA and ECOWAS also funded the rehabilitation and expansion of the distribution network in Freetown, which has already been completed. Currently, no specific donor commitment has been secured for further on-grid electrification.

Regarding technical assistance projects, the largest piece is the United States Millennium Challenge Corporation's (MCC) \$22 million program, which has supported sector reform, policy development, regulatory change and capacity building. The UK government is the country's biggest donor, with the USA, World Bank Group and the EU, among others, also being donors. As with many African countries, China is also a major investor, with an estimated \$630 million of support provided since 2001. Coordination and alignment of efforts by development partners will continue to be ensured through the donor energy sector coordination group. Annexure C presents some of the energy projects funded by financiers, and also points to a gap in the cooking sector, with very little or no focus on projects within this sector. More information on financing for energy projects at (regional) national levels and local levels will be made available as part of the ENACT project's report on "Public finance mechanisms in Sierra Leone's energy sector."

¹² *Bilateral aid: Bilateral aid refers to the provision of financial, technical, or other forms of assistance in the form of grants, loans, technical expertise, etc., from one government to another. It typically targets a range of sectors – infrastructure, health agriculture and more.*

Challenges, enablers and recommendations for increased energy access in Freetown

8.1 Challenges hindering increased energy access – Electricity and clean cooking

A number of factors contribute to the low rate of energy access in Freetown, similar to other big cities across sub-Saharan Africa. A few of them are presented below:



Poor or low access to data at the city level: Compiling this document has been challenging because of the lack of information related specifically to Freetown. Though a household survey was conducted in Susan's Bay as part of this project¹³, access to city-wide data from surveys or other sources is not readily available; rather, national-level data has been downscaled where applicable. This makes energy planning that fits into the Freetown context, specifically, an onerous task.



Enforcement of environmental regulations on deforestation: The unsustainable use of biomass fuels, such as firewood and charcoal, for cooking, contributes to deforestation and environmental degradation. In the provinces, wood is readily available. Due to the lack, or limited enforcement for reforestation, for example; fines to deter felling of trees, limited entry into forest reserves, or other forms of environmental regulation, firewood production has become a quick and easy business opportunity for citizens.



Infrastructure gaps: Inadequate infrastructure, including electricity grids and distribution/transmission networks, poses a significant obstacle to ensuring a dependable electricity supply throughout Freetown. This deficiency results in frequent power outages and voltage fluctuations experienced in many areas of the city.



Affordability: One of the highest average low voltage (LV) domestic tariffs in the ECOWAS region is in Sierra Leone, with residents spending up to 20% of their income on electricity. This, coupled with the high initial costs associated with obtaining electricity connections or adopting clean cooking technologies, creates substantial barriers for low-income households to access modern energy services.



Currency exchange and inflation: Outside international market factors, fluctuations in currency exchange rates can directly influence the price of LPG and other imported goods in Sierra Leone. When the Leone gets weaker, importers need to exchange more Leones to acquire the same amount of foreign currency needed to purchase LPG from international markets. As a result, the price of LPG in Sierra Leone tends to increase to cover the higher import costs.



Limited access to financial services: The inadequate access to financial services, including banking and credit facilities, acts as a deterrent for individuals and businesses seeking to invest in energy-related infrastructure and technologies, especially clean cooking.



Inadequate technical capacity: A deficiency in technical skills and knowledge among both local communities and service providers hinders the widespread adoption of cleaner and more efficient energy technologies. This was demonstrated during the implementation of the ENACT project, when service providers capable of delivering clean cooking technologies were not readily available, and the local communities did not have common knowledge of how to use some clean cooking technologies.



Limitations in scope and beneficiary profiles: International donor organisations can greatly influence sector activities because of the resources they command. However, this has an impact on the project location, technology deployed, etc., making the extension of the scope limited to beneficiary profiles only.



Gender disparities: Gender disparities have a notable impact on energy access, as women and girls are often primarily responsible for meeting household energy needs. In Susan's Bay, women are primarily in the kitchen, spending about 135 minutes cooking daily (PayGas, 2022). Ensuring that energy solutions are inclusive and address gender-specific challenges is imperative.



Regulatory challenges: Complex and inadequate regulatory processes within the energy sector discourage investments, making it arduous for private companies and entrepreneurs to enter the market and contribute to energy access solutions.



Lack of Awareness: Many residents may lack awareness regarding the advantages of clean and sustainable energy solutions. This lack of awareness often leads to a preference for traditional and polluting energy sources, such as witnessed during capacity-building workshops in Freetown and similarly in Susan's Bay before the community engagement and awareness campaigns by the ENACT project.



Climate change resilience: Freetown's vulnerability to the impacts of climate change, including sea-level rise, less predictable rainfall patterns and extreme weather events, introduces additional challenges for energy infrastructure and services in the city.



Investment constraints: Insufficient investment, both from the public and private sectors, in renewable energy, energy efficiency, and clean cooking projects has impeded the expansion of clean energy access in Freetown.

¹³ Feasibility studies carried out by PayGas and ILEM Africa are available: https://africa.iclei.org/wp-content/uploads/2023/11/PayGas-ENACT-Feasibility-study-Susans-Bay_03-July-2023.pdf and https://africa.iclei.org/wp-content/uploads/2023/11/UPDATED_ILEM-Africa-Feasibility-Assessment-Report-Access-to-Clean-Cooking-Solutions-in-Susans-Bay-Sierra-Leone-August-2022.pdf



Limited mandate of the local government: Freetown, like many sub-Saharan cities, has a limited mandate in energy planning and implementation. The centralised nature of the grid means cities cannot generate, distribute, or transmit electricity on their own accord.

Addressing these challenges necessitates a multi-stakeholder approach involving collaboration among government agencies, international donors, non-governmental organisations, the private sector and local communities. Overcoming these obstacles is imperative to achieving sustainable and equitable energy access not only in Freetown but also in similar urban areas in developing countries.

8.2 Enablers to improved energy access in Sierra Leone and Freetown



Political will: Energy is a political commodity in urban Sierra Leone. Therefore, in the face of rising petroleum costs in the world market, improving the provision and supply of energy through harnessing hydroelectricity and solar has been a theme of government policies for decades. The framing is that better and more reliable energy will deliver overall improved development opportunities for the country and thereby improve the ratings of the ruling party. The ruling party wants quick and visible results, and improving energy supply as part of its manifesto commitments by attracting new donor-funded projects increases the government's approval ratings.



Better transmission and distribution network: Significant efforts are also being made to improve the transmission network and extend grid connections to new areas (e.g., the CLSG network). Donor-funded projects can provide huge support mechanisms to enable the government to deliver on improving the transmission and distribution networks.



Decentralised solutions: The dense population in the city provides an opportunity for decentralised solutions or mini-grids that can be used to increase energy access rates in the city. There is also room for policy formulation, data collection and capacity-building (energy). Collaborative efforts involving governments, private sector entities, development organisations, and local communities are essential to promote sustainable and inclusive energy generation at the local level. Most of these gaps form part of the objectives of the ENACT project.



Climate change-related projects: Implementing programmes such as the ongoing Transform Freetown Agenda, while seeking to minimise deforestation and reduce GHG emissions from the energy sector, would encourage residents to adopt alternatives besides firewood and charcoal for cooking.

In summary, the challenges faced by the City, particularly around energy access, also create several opportunities for local and international organisations. This is evident in the growing number of small-scale local manufacturers of improved cookstoves and fuels.

8.3 Recommendations



Diversification of sources: Freetown City can explore the uptake of decentralised mini-grid (solar PV) systems to improve access to electricity within the city's underserved urban areas, as well as in the unserved rural areas.



Increased collaboration with the private sector: This is in synergy with one of the objectives of the ENACT project. Activities to promote more public-private partnerships will attract investments in energy infrastructure. Public-private partnerships can help accelerate the deployment of energy solutions and ensure their sustainability.



Capacity building and sustainability: Building capacity in the entire energy access and clean cooking value chain while ensuring improved expertise not only in the production of fuels and technologies but also in the additional skill sets needed to run small businesses profitably and sustainably will encourage more entrepreneurs to explore building new businesses in the energy space.



Resource efficiency and sustainability: The sustainability of the natural resources exploited during production (for example, clay used for improved cookstoves) should be considered while addressing the challenge of energy access. Avenues for reducing, recycling and reusing some materials when the stoves have reached the end of life should be considered.



Promoting financial inclusion: Introducing mechanisms such as women-focused products, financial literacy training, and mobile banking app promotion will ensure that more females and other marginalised population groups can access energy finance options from microfinance banks.



Investing in the expansion and enhancement of electrical grids and transmission/distribution networks: As utilities upgrade existing infrastructure and extend the grid to underserved areas, this will ensure a more reliable electricity supply to all parts of the country, especially Freetown.



Enforcement of regulations: Strengthening enforcement of environmental regulations related to deforestation and unsustainable fuelwood use and implementing appropriate measures can promote sustainable cooking practices and reduce environmental degradation.



Energy infrastructure and climate resilience: Incorporate climate resilience considerations into energy infrastructure planning and design. This includes measures to protect energy assets from the impacts of climate change.



Support to those employed in the charcoal and firewood production chain: Provision of alternative livelihoods for those involved in felling trees, producing charcoal, transporting and retailing firewood and charcoal through capacity building and support for their new businesses will promote employment and, over time, reduce the dependence on charcoal or firewood-related businesses.

Conclusion

Electrification rates in Sierra Leone are low not just in cities but nationwide, though Freetown and major cities like Bo, Kenema and Makeni reportedly have higher electrification rates. The clean cooking scenario in Freetown is similar to the rest of Sierra Leone, where the majority (over 98%) of the population rely on charcoal and firewood for cooking, with a very small percentage of households using LPG or electricity or other modern fuels and technologies for cooking.

The roles of major players in the Sierra Leonian energy sector, as well as national policies and renewable energy potential, have been presented. Although challenges such as a lack of energy responsibilities devolved to local government authorities, especially with regards to improving grid supply, have been identified, a few enablers and recommendations to support decentralised energy supply and improve access to electricity (decentralised mini-grids) and clean cooking that can be worked on at the local level have been presented.

Though it was challenging to get Freetown-specific data, some of the data and information received from the ENACT project activities, such as household surveys, bilateral meetings, technical and capacity-building workshops and other sources, have been incorporated to update this report. It is envisaged that this will be an invaluable resource for the City in being more familiar with the status quo and challenges being encountered, so that this can lead to planning for actions to boost energy access for Freetonians, and invariably, Sierra Leone.

Source: Carine Buma



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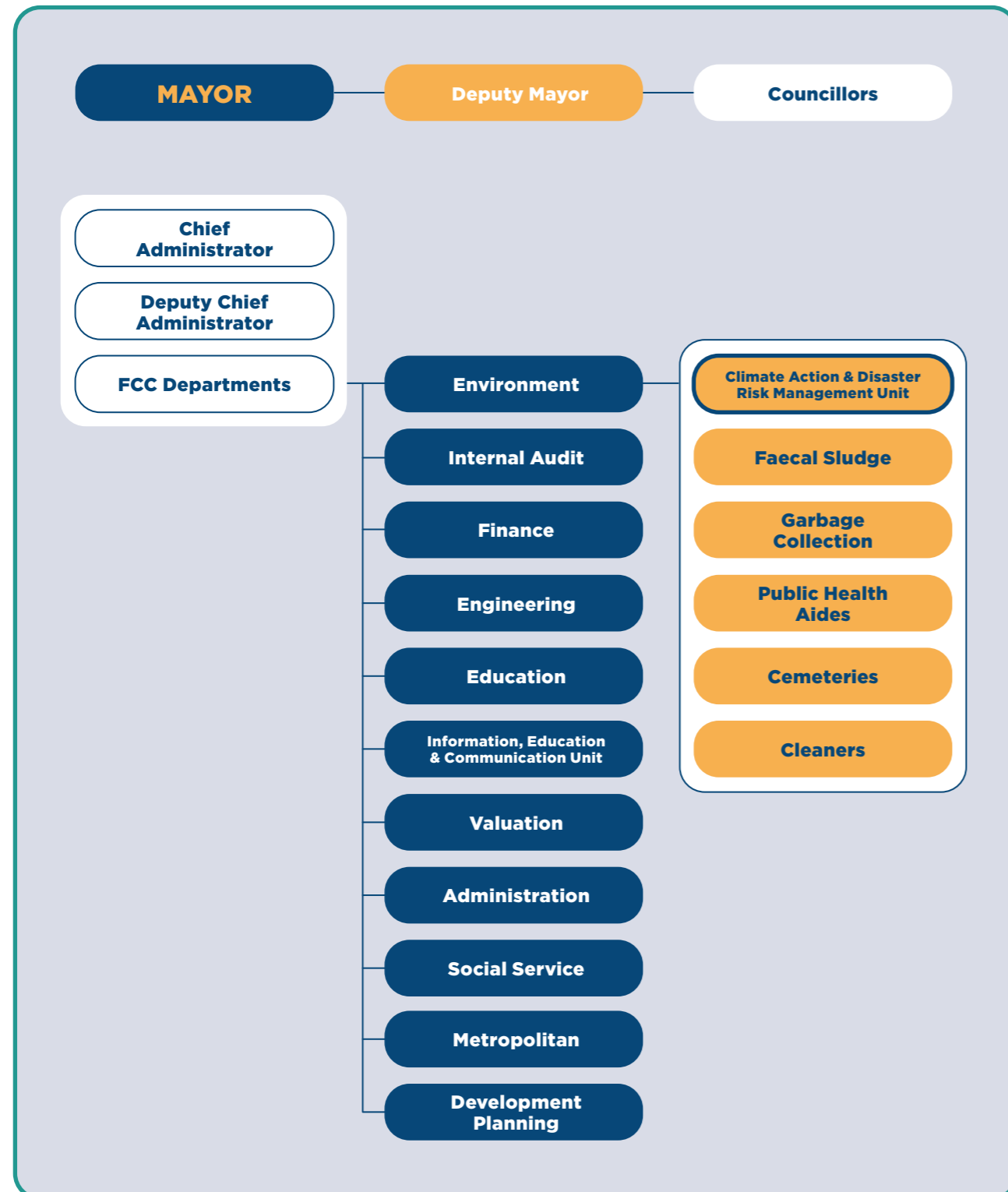
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Annexes

Annex A: Freetown City Council Organogram

Source: Freetown's first Climate Action Strategy 2022-2030



Annex B: EDSA tariff structure

APPROVED TARIFF BY SIERRA LEONE ELECTRICITY AND WATER REGULATORY COMMISSION FOR ELECTRICITY DISTRIBUTION AND SUPPLY AUTHORITY (EDSA) EFFECTIVE 1 October 2023¹⁴.

Customer Class	Description of Charge	Units ¹⁵	Approved Tariff Excluding GST ¹⁶	Approved Tariff including GST
Tariff per KWh for Prepaid and Post-Paid Customers			2023	
T1 Social Band	First 0-25 kWh per month for All T1 Residential Customers	SLL/kWh	1,819	2,092
T1 Normal Band	Consumption Exceeding 25 kWh to ≤ 200 kWh per month for all T1 Residential Customers	SLL/kWh	4,220	4,853
T1 High-End Users	Consumption Exceeding 200 kWh per month for all T1 Residential Customers	SLL/kWh	4,584	5,271
T2 Commercial	Commercial	SLL/kWh	5,511	6,338
T3	Institutions	SLL/kWh	5,305	6,100
T4	T4 Large Customer and Industries	SLL/kWh	5,856	6,735
T7	Welding	SLL/kWh	4,961	5,705
T5	Street Lighting	SLL/kWh	3,839	4,415
SERVICE CHARGE				
T1 SG PREP	T1 Residential Service Charge	SLL/month	11,000	11,000
T2 SG PREP	T2 Commercial Service Charge	SLL/month	16,000	16,000
T3 SG PREP	T3 Institutions Service Charge	SLL/month	16,000	16,000
T4 SG PREP	T4 Industries Service Charge	SLL/month	77,000	77,000
T7 SG PREP	T7 Welding Service Charge	SLL/month	41,000	41,000
T5 SG PREP	T5 Street Lighting Service Charge	SLL/month	32,000	32,000
T1 SG PP	T1 Residential Service Charge	SLL/month	13,000	13,000
T2 SG PP	T2 Commercial Service Charge	SLL/month	18,000	18,000
T3 SG PP	T3 Institutions Service Charge	SLL/month	18,000	18,000
T4 SG PP	T4 Industries Service Charge	SLL/month	80,000	80,000
T7 SG PP	T7 Welding Service Charge	SLL/month	45,000	45,000
T5 SG PP	T5 Street Lighting Service Charge	SLL/month	35,000	35,000

The above tariff structure was resolved at the board meeting on 26 September 2023 in the fulfilment of the Sierra Leone Electricity and Water Regulatory Commission Act 2011, Section 45(1). »

¹⁴ <https://ewrc.gov.sl/wp-content/uploads/2023/10/Approval-for-Gazette.docx>

¹⁵ The old denomination of Leones is used here.

¹⁶ GST - Goods and Services Tax

Annex C: National energy projects and programmes

Institution	Project description	Type of funding	Amount	Timeframe
SEforALL	<p>A health electrification project for six hospitals in Freetown, Kambia, Masanga, Kabala and Bonthe, with a combined total of approximately 530 kWp of solar PV with battery storage¹⁷.</p> <p>A six-month traineeship will provide hands-on technical training for 12 female graduates¹⁸.</p> <p>Partners involved: FCDO and Global Energy Alliance for People and the Planet (GEAPP) in close coordination with the Ministry of Health and Sanitation (MoHS) and the Ministry of Basic and Senior Secondary Education (MBSSE).</p>	Grant funding	\$150 million	2023
The World Bank	<p>Regional Emergency Solar Power Intervention Project (RESPITE)¹⁹ to expand access in Chad, Liberia, Sierra Leone and Togo by adding 106 MW of solar with storage and 41 MW of hydropower.</p> <p>Partners involved: World Bank and the Governments of Sierra Leone, Chad, Liberia, and Togo</p>	Grant	\$311 million	5 years
	<p>Financed the management contractor for the Energy Distribution and Supply Authority and wider sector reform.</p>	Energy Sector Utility Reform Project (P120304)	\$40m	31 Dec 2023
	<p>The West Africa Power Pool (including \$60m International Development Association (IDA) credit for the CLSG line.</p>	Energy Sector Utility Reform Project (P120304)	\$60m	2021-2026
	<p>The CLSG transmission line will run from Cote D'Ivoire to Guinea and will include five substations in Sierra Leone, with the potential for these to provide direct distribution throughout the country.</p> <p>A single circuit line was completed in 2021 and a second 243 MW line was proposed in 2022.</p> <p>Partners involved: KfW, EIB, and AfDB</p>	Co-finance from the African Development Bank	\$2,924,855.80	Completed by 2021. Second line TBC.

¹⁷ <https://www.seforall.org/sierra-leone-hospital-electrification-project>

¹⁸ <https://www.seforall.org/news/seforall-helping-young-women-build-renewable-energy-careers-in-sierra-leone>

¹⁹ 'West African states kick off \$311 million project to boost renewables: <https://www.mercomindia.com/west-africa-311-million-project-boost-renewables>

Institution	Project description	Type of funding	Amount	Timeframe
The World Bank	<p>Regional Off-Grid Electrification Project (ROGEP) covers 15 ECOWAS and four Sahelian (Chad, Cameroon, Central Africa Republic and Mauritania) Countries.</p> <p>Partners involved: ECREEE (Technical Assistance) and Banque Ouest Africaine de Développement (BOAD) (Financial Support)</p>	Co-financing West African Development Bank (BOAD), Economic Community of West Africa States (ECOWAS)	\$338.7 million	Dec 2030
African Development Bank (AfDB)	<p>AfDB is considering financing rural electrification opportunities along the CLSG line corridor.</p>	Co-financing	TBC	TBC
	<p>DFID (now FCDO) sponsored and funded the Bo-Kenema transmission line.</p>	Co-financing	TBC	TBC
	<p>Addax bioenergy facility near Makeni included a large consortium of financiers.</p> <p>Partners involved: EAIF, FMO Swedfund, BIO, DEG and the IFC</p>	Co-financing	Total project costs over \$300m	Built-in 2014
	<p>Sustainable Energy Fund for Africa (SEFA)</p> <p>Partners involved: Danish government</p>	Grant co-financing	Up to \$1m	2011-TBC
Japan International Cooperation Agency (JICA)	<p>JICA is providing grant aid for the construction of a substation and power distribution network at the southern end of the Freetown Peninsula.</p>	Grant funding	2.070 billion yen	2022
	<p>JICA is providing some support to distribution investment (and previously to the Western Area Master Plan), as is the Islamic Development Bank (IDB).</p>	TBC	TBC	TBC
The Department for International Development (DFID) (now FCDO)	<p>A £35m rural electrification programme building mini-grids to attract private operators to manage them – essentially delivering the Energy Africa Compact signed by the Government of Sierra Leone (GoSL).</p> <p>Partners involved: UNOPS</p>	TBC	£35m	TBC
	<p>Rehabilitation of the Bo-Kenema transmission and generation facilities will also link to the CLSG.</p> <p>Co-financed by AfDB and GoSL.</p>	Grant financing	£31.5m of a total of £43m committed	

Institution	Project description	Type of funding	Amount	Timeframe
Millennium Challenge Corporation's threshold programme	Committed to supporting the water and energy sectors to strengthen the capacity of the EWRC and EDSA, build capacity at the Guma Valley Water Company and help the government to operationalise a new framework and market structure for the country's electricity sector.	TBC	Around \$44m committed	(since 2017)
GOAL	Liquid Waste Treatment Plant utilising innovative Geobag de-watering technology that separates liquid and solid waste. The Plant had processed 1,500 truckloads of faecal sludge – 15% of Freetown's liquid waste. Over 11 Kt of sludge has been processed so far, saving a vast amount of liquid waste from contaminating the environment and reducing risk hazards for the communities. Partners involved: FCDO and in partnership with Freetown City Council	Grant funding		Ongoing initiative since 2022
Freetown Waste Transformer	The Freetown Waste Transformers turn organic waste into electricity, replacing diesel generators with green technology to reduce the cost of energy and increase the reliability of energy and heat. Partners involved: Climate Fund Managers (CFM), along with our technology partners	Grant funding	\$3.9m	Ongoing initiative since 2022





Freetown City Energy Profile

APRIL 2024