



ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

Advancing Mini-Grids in Sierra Leone: Exploring a Holistic Framework of Policies, Regulations, and Institutions

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ABBREVIATIONS

ASI	Adam Smith International
ATP	Ability-to-pay
CAPEX	Capital expenditure
DFID	UK 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
EnDev	Energising Development Programme
EPA-SL	Environmental Protection Agency of Sierra Leone
EU	European Union
EUEI PDF	EU Energy Initiative Partnership Dialogue Facility
IEC	International Electro-Technical Commission
IRP	Integrated Resource Plan
MCC	Millennium Challenge Corporation
MDAs	Ministries, Departments and Agencies
MLGRD	Ministry of Local Government and Rural Development
MoE	Ministry of Energy
MoFED	Ministry of Finance and Economic Development
MoHS	Ministry of Health and Sanitation
M&E	Monitoring and Evaluation
NEP	National Energy Policy
NEEP	National Energy Efficiency Policy
NPA	National Power Authority
NREAP	National Renewable Energy Action Plan
NRECA	National Rural Electric Cooperative Association (US)
NREL	National Renewable Energy Laboratory
NREP	National Renewable Energy Policy
PUE	Productive use of energy
PURE	Productive use of renewable energy
RE	Renewable energy
REASL	Renewable Energy Association of Sierra Leone
RISE	Regulatory indicators for sustainable energy
RREP	Rural Renewable Energy Project

SADC	Southern African Development Community
SLWERC	Sierra Leone Electricity and Water Regulatory Commission
TBD	To be decided
UNDP	United Nations Development Programme
UNOPS	United Nations Office for Project Services
UK	United Kingdom
US	United States
USAID	US Agency for International Development
WTP	Willingness-to-pay

KEY FINDINGS

This report provides analysis on ongoing rural electrification efforts of the Government of Sierra Leone. It builds on an earlier briefing paper entitled *Rural Electrification in Sierra Leone: The Role of Mini Grids vis-à-vis Stand-alone Home Systems and Grid Extension*, also authored by SD Strategies.

The report outlines key findings based on the review of existing policies and regulations that are relevant for developing the mini-grid sector in Sierra Leone. It then discusses policy and institutional reform options that can inform the Government's decision-making. Our analysis uses an original framework based on international best practice for mini-grid sector development. This holistic framework details key policy, regulation and effective governance indicators and was designed specifically to assess the current status of the policy environment in Sierra Leone. This framework can serve as a toolkit and reference guide to keep track of progress in supporting the advancement of mini-grids in Sierra Leone.

Among the report's key findings are:

Institutional Development and Capacity-Building Priorities

▪ **Prioritising effective implementation of mini-grid regulations**

The recently developed mini-grid regulations represent a significant step forward in creating a conducive market for private sector-led mini-grid development in Sierra Leone¹. The draft *Electricity and Water Regulatory Commission Mini-grid Regulations 2018* outlines key information on licensing arrangements, tariff structures, grid arrival, and other areas. The document also sets ambitious timelines for critical processes, such as a 30-day limit for reviewing and deciding on mini-grid licence applications.

Once approved by Parliament, timely implementation of the regulations will be crucial. It is important to clearly outline the responsibilities (i.e. which department/officer within the Sierra Leone Electricity and Water Regulatory Commission will be responsible for the implementation), assign enough staff, and include clear timelines for the regulations to become fully operational. A monitoring framework may be helpful to track the implementation of the new regulations over the following few years, with specific "check-in" dates set for review and adjustment, if necessary. This should be done in accordance with the reporting requirements of the Steering Committee overseeing the implementation of the broader Electricity Sector Reform Roadmap.

▪ **Creating human capacity and establishing responsibility in rural electrification policy**

Leadership and well-trained staff are critical for the development of successful policies for rural electrification. To this end, an agency with a specific mandate on rural and peri-urban electrification, such as the Rural and Peri-Urban Electrification Authority envisioned in *the Updated Electricity Sector Reform Roadmap (2018-2030)*, could be established. This organization could centralize decision-making and implementation processes, help attract additional financial and human resources, and improve effectiveness and efficiency overall.

The added value of such an additional institution should be further considered within Sierra Leone's institutional, policy and regulatory environment. Given the immediate need for quick improvements and limited financial resources, a short-term focus on capacity building within existing institutions and agencies could be prudent. The Rural Electrification Department in the Ministry of Energy could lead the design of policy and statutory instruments while the Electricity Distribution and Supply Authority as well as the Sierra Leone Electricity and Water Regulatory Commission could oversee their

¹ The draft regulations are currently ongoing public consultation, before being submitted to Parliament for approval.

implementation. It is important to avoid overlapping responsibilities amongst the three agencies as much as possible. In the medium to long-term, the capacity and knowledge developed within these institutions could form the basis for establishing the Rural and Peri-Urban Electrification Authority.

- **Strengthening multi-level cross-sectoral collaboration**

Energy-sector planning requires effective inter-agency collaboration across various levels of government. This is particularly relevant for rural electrification given the potential for enabling socio-economic development in remote areas of the country. Currently, multi-level cross-sectoral collaboration remains an enormous challenge in Sierra Leone. It is important that the federal and sub-federal policy integration, as well as the mainstreaming of energy policy throughout different sectors, receives attention throughout the mini-grids strategy design and implementation cycle.

- **Creating an independent and responsive regulator**

As foreseen in the *Sierra Leone Electricity and Water Regulatory Commission Act (2011)*, the newest draft of mini-grid regulations envisions a strong role for the Commission, including setting cost-reflective tariffs for full mini-grid licensees and tariff adjustment (Sierra Leone Electricity and Water Regulatory Commission 2018)². Ensuring the independence and capacity of the Commission is crucial. The latter includes the development of capacities at the technical level and, subsequently, the retention of institutional knowledge. Continuous engagement and responsiveness from the regulator are also important to facilitate the tariff adjustment measure.

Policy Priorities

- **Ensuring consistency among different policy documents**

Significant policy and regulatory developments have occurred in the country over the last few years. Moving ahead, the challenge is to ensure consistency among various documents, as they are being developed at different speeds and often with support from different external organisations. For example, since the new *Renewable Energy Policy (2016)* sets a clear mandate for rural electrification, it is expected that this policy goal would also be streamlined in other policies, such as the *National Energy Policy and Strategic Plan*, that currently are being updated with the assistance of the United Nations Development Programme.

- **Prioritising the provision of information that is most useful for mini-grid developers**

An important role of the Government in supporting private sector-led rural electrification is to ensure the availability of information about sector planning, market and technological conditions. Easy access to up-to-date information – such as grid extension planning, renewable energy potential mapping and demand assessment mapping – can lower the costs for and encourage the interest of private sector developers. It is important that the development and continuous updating of such information becomes a priority for the key energy sector institutions. As a first step, a stronger focus could be put on ensuring that all studies and project-level information from international development institution supported programmes is aggregated and made publicly available. The success of this process is also dependent on effective collaboration and information sharing between different government institutions.

² The draft regulations make a distinction between a basic mini-grid licence (a licence for generation, and a licence for sale of electricity via a mini-grid of up to 100 kilowatts (kW) of distributed power per site), and a full mini-grid licence (a licence for generation, distribution and sale).

- **Balancing the need for data collection and manageable reporting requirements**

Information from active mini-grid developers in Sierra Leone can provide the Government with valuable data to support project proposal evaluations, as well as insights for rural electrification planning and for attracting additional external financing. However, extensive reporting requirements can also add to the administrative costs of developers. It is important to achieve the right balance taking both elements into account. One way to accomplish this is for the Government to design reporting requirements that are tailored according to the size of the mini-grid project. Such arrangement is envisioned in the draft *Electricity and Water Regulatory Commission Mini-grid Regulations 2018*. In this case, it is important that the licensing fees are reflective of this arrangement.

- **Providing financial support for mini-grid developers**

Financial incentives can help developers close the financial viability gap and realize more projects. Key government support measures in this area can include duty exemptions, subsidies and loan guarantees. To date, the majority of mini-grids in Sierra Leone have been developed under the *Rural Renewable Energy Project* which is acting as a catalyst for development. Beyond the priority sites under this project, identifying additional commercially viable areas for mini-grid development is likely to be challenging and could require further support measures in the future.

Both mini-grid-specific and broader mechanisms could be considered for financial support. Should the Government decide to implement broader financing mechanisms to support rural electrification efforts, such as the Rural Electrification Fund for co-financing priority projects envisioned in the *Updated Electricity Sector Reform Roadmap (2018-2030)*, targeted measures could be included to support the mini-grid sector. The design of “smart” modalities for accessing the funding could encourage mini-grid developers to focus on the development of productive uses of electricity in line with Sierra Leone’s rural socio-economic development priorities.

- **Monitoring the cost of electricity and addressing affordability**

While acknowledging the need for cost-reflective tariffs, the overall willingness-to-pay and ability-to-pay of households and business to be served also should be considered. It is important that the Sierra Leone Electricity and Water Regulatory Commission continually monitors and possesses a thorough understanding of the cost of electricity and assesses the willingness-to-pay across the country. Communicating the results to the Ministry of Energy would enable smarter electricity sector planning.

INTRODUCTION

Over the last decade, Sierra Leone has begun significant efforts to transform its energy sector. These include both institutional and policy reforms. Regarding the former, the Electricity Act (Government of Sierra Leone (GoSL) 2011a; updated GoSL 2017) paved the way for unbundling the formerly monopolistic and vertically integrated state company National Power Authority (NPA), the liberalisation of the electricity supply sector, and the creation of the Regulatory Commission. Progress in policy development has been substantive as well, with the National Renewable Energy Action Plan (NREAP) (Ministry of Energy (MoE) 2015) and National Renewable Energy Policy (NREP) (MoE 2016), the National Energy Efficiency Policy (NEEP) (MoE 2017), the Electricity Sector Reform Roadmap (MoE 2017a)³, the Sustainable Energy for All Action Agenda (SEforAll 2015) and SEforAll Investment Prospectus (SE4All 2016), as well as the draft Sierra Leone Electricity and Water Regulatory Commission (SLEWRC) Mini-grid Regulations (SLEWRC 2018)⁴ all having been launched within the last few years.

Several activities in this area are still ongoing, most importantly the updating of the 2009 National Energy Policy (NEP) with the assistance of the United Nations Development Programme (UNDP) and the development of a Strategic Plan based on the new direction assigned by the Government that emerged for the March 2018 election⁵.

The Mandate for Mini-Grids

The Sierra Leone Renewable Energy Policy sets a clear priority target to provide sustainable and cost-effective electricity to all people, including the 60% of the population that lives in areas so remote that they are considered off-grid locations (GoSL 2016; Ochs 2017)⁶. As part of its electrification efforts, the Government envisions a clear role for the development of mini-grids, which are considered the main solution for extending electricity access to 27% of the currently unelectrified population. Building on this mandate, the development of policy and regulation to support the mini-grid sector is being incorporated in broader energy sector planning. The Updated Electricity Sector Reform Roadmap (2018-2030) (MoE 2018)⁷ is a strategic document for the advancement of the power sector in Sierra Leone, incorporating both grid-connected and off-grid electrification planning and using a staged implementation approach. Measures targeted at the development of the mini-grid segment are an integral part of the Roadmap. A priority measure identified in the Roadmap – the development of mini-grid licensing – was recently included in the draft SLEWRC mini-grid Regulations (2018).

Overview and Use of the Assessment Framework

Building on international best practices in the field of mini-grid development, this report presents a five-pillar analytical framework with a set of specific indicators. It has been designed for the purpose of this technical assistance to the Government of Sierra Leone, but it may be adapted for the analysis of other

³ The document was updated in October 2018. See Electricity Sector Reform Roadmap Update (2018-2030).

⁴ The draft regulations are currently ongoing public consultation, ahead of their submission for parliamentary approval.

⁵ The Updated Electricity Sector Reform Roadmap (2018-2030) categorises the new Government's priorities along four key pillars: (1) Governance improvement (including technical Audit of the Energy Sector); (2) Secure a robust reform process in the Electricity Sector at institutional, regulatory, commercial and financial levels (including regional market integration); (3) Restore Electricity Supply to all District Capitals; (4) Invest in low-cost renewable projects: Solar, Hydro, Wind and Biomass (MoE 2018, p. 16).

⁶ These areas are regarded as technically difficult and / or too costly to connect to the national grid in the foreseeable future.

⁷ The document is yet to be officially endorsed by the Government. From here on referred to as 'the Roadmap'.

countries as well. The detailed list of indicators aims to provide a comprehensive toolbox outlining key measures that, if fully implemented, can help create an enabling environment for the advancement of mini-grids in Sierra Leone. It can be used as a yardstick to guide decision makers as they design policies and measures in a situation of constrained human, financial, and technical resources.

The assessment framework has been designed by SD Strategies, as part of the Clean Energy Solutions Center Ask an Expert service, drawing from international literature on the creation of policies and regulations that support mini grid development⁸.

The selected indicators are used as the basis for an assessment of current policies, regulations and administrative systems; all reviewed documents are listed in the resources section at the end of the paper. It is important to note that several of the key documents are yet to be submitted for parliamentary approval or have only recently been approved. This is particularly the case for the draft *SLEWRC Mini-grid Regulations*. For this reason, the effectiveness of the implementation of these policies and measures cannot be fully assessed at this stage. Nevertheless, the analysis of indicators in the assessment framework informs the findings presented in this report and we hope they can be useful to further advance mini-grid sector development in Sierra Leone.

⁸ Key reports used to inform the design of the framework: Economic Consulting Associates and Practical Action (Southern Africa) (2013). Supportive framework conditions for mini-grids employing renewable and hybrid generation in the SADC Region. <http://www.euei-pdf.org/en/recp/supportive-framework-conditions-for-green-mini-grids>; Franz, M., Peterschmidt, N., Rohrer, M., Kondev, B. (2014). Mini-grid policy toolkit: policy and business frameworks for successful mini-grid roll-outs. EU Energy Initiative Partnership Dialogue Facility (EUEI PDF); Tenenbaum, B., C. Greacen, T. Siyambalapitiya and J. Knuckles (2014). From the bottom up: How small power producers and mini-grids can deliver electrification and renewable energy in Africa. Directions in Development. Washington, DC: World Bank; United States Agency for International Development. Mini-grids support toolkit. Available at: <https://www.usaid.gov/energy/mini-grids>; World Bank. Regulatory indicators for sustainable energy (RISE). Available at: <http://rise.worldbank.org>.

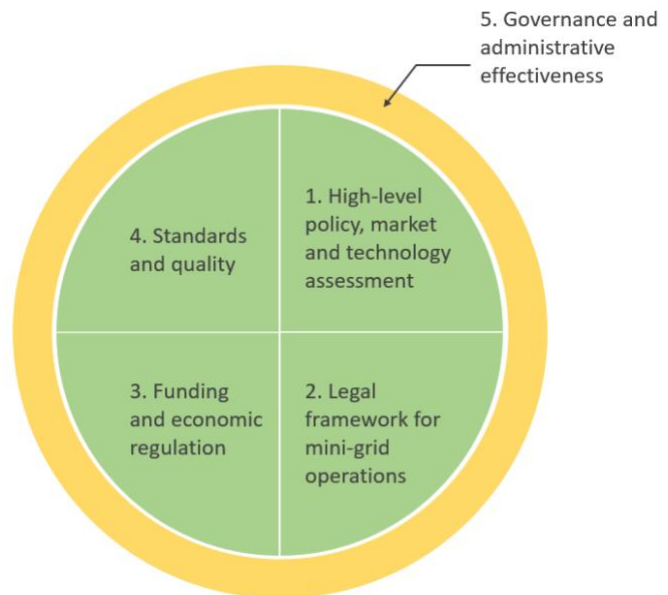
A HOLISTIC APPROACH TO MINI-GRID DEVELOPMENT

The development of the energy sector in any country requires long-term commitment and a comprehensive system-wide approach. The same logic applies to strategies concerning the advancement of mini-grids. While this could be considered as a sub-section of wider energy sector planning, the key elements are still of equal importance and require adequate attention.

A holistic combination of policy, regulatory processes and effective governance is required to encourage private sector-led mini-grid development for rural electrification. The dual focus on *what* decisions are made (policy/regulatory measures) and *how* they are made (governance) is particularly important.

Five key pillars of the framework

1. High-level policy, market and technology assessment
2. Legal framework for mini-grid operations
3. Funding and economic regulation
4. Standards and quality
5. Governance and administrative effectiveness



A Brief Introduction of the Five Pillars

Based on international best practice, five core focus areas can be identified in which governments can design and implement activities. The right mix of policies and measures from all five areas creates a comprehensive approach capable of advancing the development of the mini-grid sector.

Pillar 1. High-level policy, market and technology assessment

Mini-grid development does not take place in isolation and it should not be considered the only solution to rural electrification needs. Rather, it is an integral part of broader energy sector planning. The Government can make a strategic decision to include mini-grids in its rural electrification planning. If it does, it needs to select its preferred model for mini-grid development in the country and have it mainstreamed across renewable energy policy and electrification planning. This also includes providing up-to-date information on existing demand and technology to private sector developers.

Pillar 2. Legal framework for mini-grid operations

Once the policy commitment to the advancement of mini-grid-based rural electrification is made, key legal provisions can be put in place that allow private developers to operate in the sector. Beyond the legal modalities, the administrative effectiveness of the licensing process can be a defining factor for mini-grid developers that are considering entering the market. The key is to design a licensing framework and processes that are sufficiently robust to ensure that only worthy players enter the market, while at the same time not overburdening the entry process and discouraging new and smaller players. The pillar also focuses on legal provisions for grid arrival in mini-grid project areas.

Pillar 3. Funding and economic regulation

The economics of mini-grid development in sub-Saharan Africa are challenging, given the remote locations, limited ability-to-pay of customers and generally low electricity consumption. Tariff setting and adjustment is a defining factor for the financial sustainability of a mini-grid. However, a tariff that is reflective of real investment costs can often be unaffordable to the parts of the population that the mini-grid aims to serve and is likely to be higher than that offered to grid-connected. A broad range of public support mechanisms can be applied to address mini-grid financial viability and affordability challenges. The three elements of financial viability, affordability and financial support mechanisms are closely interlinked and covered jointly under pillar 3.

Pillar 4. Standards and quality

The fourth pillar focuses on standards and quality of renewable energy production and distribution technology. The importance of these elements should not be understated, particularly in the field of energy access, where most consumers have low ability to pay. Low-quality technology carries safety and environmental risks. The availability of low-quality, low-cost alternatives can pose a significant risk to responsible mini-grid developers, as it distorts the market. Low performance of such appliances leads to damaged consumer trust which can be difficult to regain. The indicators under this pillar therefore focus on the robustness of standards on quality, safety and environmental sustainability, as well as their effective enforcement.

Pillar 5. Governance and administrative effectiveness

Good governance and administrative effectiveness are key to ensuring that policies and regulations are implemented and achieve the desired effects on the ground. Under the holistic framework, this forms the fifth pillar, which is considered as both an independent category deserving individual consideration as well as an approach that can be mainstreamed across all other focus areas.

The indicators in this category that are mainstreamed throughout the framework address three basic elements of good governance: local government participation and public engagement, transparency and accountability, and the extent to which they are practiced in mini-grid sector policy and regulation. This is complemented by an overview of the institutional set-up, as well as an assessment of capacity and effectiveness of the governance processes. In line with the approach of holistic sectoral development, this highlights the importance of a close relationship between the content of policy and regulatory measures (the what) and governance (the how) for a sustainable impact. The final section is dedicated to discussing in more depth the aspects of institutional co-ordination, capacity and public participation in policy and regulatory processes.

AN ASSESSMENT OF THE LEGISLATIVE, POLICY AND INSTITUTIONAL LANDSCAPE FOR MINI-GRID DEVELOPMENT

The following code has been used for the assessment of the 5 pillars:

Y	Yes (the measure has been implemented or is suggested by existing governmental plan or legislation)
(Y)	The assessment conducted within the scope of this study indicates that the measure is currently at some stage of development or implementation, but final certainty could not be secured.
N	No (the measure has not been implemented and is not suggested by existing governmental plan or legislation)
(N)	The assessment conducted within the scope of this study indicates that the measure is currently at no stage of development or implementation, but final certainty could not be secured.
P	The measure is only partly addressed
?	Not enough information could be found to assess the status of the indicator
N/A	Not applicable
(grey)	Grey colour coding indicates that the policy or measure relates to the assessment of governance and administrative effectiveness, which is assessed across all pillars

1. High-Level Policy, Market and Technology Assessment

Key findings:

- Significant policy and regulatory developments have occurred in the country over the last few years. Moving ahead, the challenge is to ensure consistency among various documents, as they are being developed at different speeds and often with the support of different external organisations and effective implementation of policies through statutory instruments.
- Lack of up-to-date information (resource mapping; electrification planning, etc.) increases risk for private developers, raises development costs (in cases where developers need to undertake various assessments at their own cost) and thus increases barriers to entry. This is a key challenge for the Government of Sierra Leone and requires continuous focus in order to be solved. As the first step, a stronger focus could be put on ensuring that all studies and project level information from across the various programmes supported by international development institutions is aggregated and made publicly available. The success of this process is also dependent on effective collaboration and information sharing between different government institutions.

Overview:

The two key documents that outline renewable energy planning in Sierra Leone are the NREAP (MoE 2015) and the NREP (MoE 2016). The documents set a 65.3% target for renewable energy (RE) share in the (grid-connected) electricity mix by 2030 and a target of 27% share of rural population being served by RE and hybrid mini-grids by 2030. This provides a strong mandate for RE development in the country, as well as, more specifically, clean mini-grid-based rural electrification.

The documents also outline technology specific targets. The targets specifically aim to align Sierra Leone's energy policy with recommendations of the Economic Community of West African States' Centre for Renewable Energy and Energy Efficiency (ECOWAS/ECREEE). The targets are set for three key benchmarks of 2010, 2020 and 2030, which are further supported by yearly projections. Measures for achieving the targets, as outlined in the NREAP, are also set, which provides a solid basis for the design of a monitoring framework. While the responsibilities for monitoring the implementation of the policies are clearly assigned, the effectiveness of the systems and processes established for this purpose need to be further

assessed. It appears that some of the measures identified in the NREAP are falling behind schedule – e.g. the review of the National Energy Policy (MoE 2009) was due to be completed by 2016 but is currently still at the early stages of development (with the support of UNDP).

Data availability remains a key challenge. The absence of a detailed and up to date renewable energy resource mapping, clear and transparent national and rural electrification planning, as well as regularly updated socio-economic survey data creates significant barriers for private sector engagement in rural electrification. The importance of addressing these data challenges is acknowledged in the *Updated Electricity Sector Reform Roadmap* (also referred to as Integrated Resource Plan (IRP)) (MoE 2018). The Roadmap recommends the establishment of a database with detailed information about the existing off-grid projects (including information on system specifications, cost and performance), as well as production of detailed technology-based resource mapping. These actions are identified as a priority for 2018-2020.

Off-grid sector data collection and management form the key focus of the Energising Development (EnDev) programme in Sierra Leone. The programme supported the development of the Renewables Sierra Leone website, which aims to serve as a single platform for all stakeholders of the renewable energy sector to connect, cooperate and share information. The website includes a map detailing mini-grid installations in the country⁹. The success of the project, at current stage, highly depends on information sharing by project implementers. This has been one of the key challenges both within the mini-grid development space and the broader energy sector. It is important that the Steering Committee overseeing the implementation of the Roadmap plays a more proactive role in ensuring that information from various electricity sector projects is pulled together internally and made publicly available.

The ongoing revision of the National Energy Policy provides a window of opportunity for resource mapping to be incorporated in the national energy planning. As it currently stands, the most up to-date information on the potential for mini-grid development in the country stems from the site assessment and selection study conducted under the Sierra Leone Rural Renewable Energy Project (RREP). However, the focus of the assessment is on the needs of the project rather than on providing a comprehensive overview of the mini-grid potential across the country which could support mini-grid development beyond the scope of the RREP. Nevertheless, the data could prove to be a useful resource for rural electrification practitioners if made publicly available. Additional efforts have been made to support the Government's rural electrification planning through a study outlining a methodology for the selection of the 'right' technical solution – a comparative approach between mini-grids, stand-alone systems and grid extension (Ochs 2017).

The Updated Electricity Sector Reform Roadmap provides a high-level overview of the planned expansion of the transmission network¹⁰. A detailed country-wide analysis on the potential power extension scenarios has been undertaken by an international consulting firm on behalf of the MoE in 2016¹¹. The study – resembling a national electrification plan – includes a country-wide demand forecast, as well as estimates for the distribution network by geographical areas of interest. The analysis also informed the development of a transmission and distribution investment plan for the period of 2015-2029 (MoE 2017b). A more recent forecast for the extension of generation capacity (including geospatial mapping), required distribution infrastructure and the requisite investment is available under the Financial Sustainability Framework and Action Plan for the Power Sector of Sierra Leone, developed with the support of the Millennium Challenge Corporation (MCC) (Adam Smith International (ASI) 2018 and 2019). However, the

⁹ Available from: <http://www.renewables-salome.info/index.php/map/location-of-mini-grids-in-sl>.

¹⁰ See Section 4.2.4.

¹¹ The assignment was conducted by the National Rural Electric Cooperative Association (NRECA) and is referred to as the 'NRECA study'.

absence of a publicly available, single source of information with details on planned transmission and distribution grid extensions is a significant barrier to the mini-grid sector development. An integrated planning document, which is being regularly updated, would provide this necessary information to private developers.

While there are no periodic energy-focused surveys, the integrated household survey does include some energy-focused questions, although to a very limited extent. The latest report published by Statistics Sierra Leone presents 2011 data on household source of lighting and annual electricity bills by region (Statistics Sierra Leone 2014). As of the time of writing this report, collection and processing of data for the 2018 survey is still ongoing. Survey questionnaires include more detailed questions covering issues of safety and reliability, as well as the existing availability and decision-making regarding grid connection (Statistics Sierra Leone 2018). Under the Employment section, the question related to the number of hours worked includes the option of an electrical breakdown, which could show the impact of unreliable electricity supply on economic growth. Overall, however, the scope of the focus and level of disaggregation of data (on energy related questions) remain limited. Closer collaboration between the Statistical Office and the MoE could lead to a revised questionnaire that is more in line with the data needs for future energy sector planning. It is also crucial that raw data from the survey is made publicly available on the Statistics Sierra Leone website.

Preliminary assessment of the current situation

1.1 Renewable energy planning

1.1.1	Does an official renewable energy target exist? (overall / by technology)	Y/Y
1.1.2	Are renewable energy targets in line with regional / international commitments? (e.g. ECOWAS, African Union's Agenda 2063)	Y
1.1.3	Does the target have specific sub-targets for grid / off-grid?	Y
1.1.4	Does a renewable energy action plan or strategy to achieve the target exist?	Y
1.1.5	Is the plan based on a renewable energy resource assessment?	P
1.1.6	Does the plan include detailed mapping for individual technologies?	(N)
1.1.7	Is the full resource mapping publicly available?	(N)
1.1.8	Does the plan or strategy define the amount of investment necessary to meet the renewable energy target?	Y
1.1.9	Is there an institution responsible for tracking progress in renewable energy development?	P
1.1.10	Does the policy / strategy / action plan have a clear timeline?	Y
1.1.11	Localisation: are renewable energy / mini-grid technologies incorporated into industrial development policies?	P

1.2 National electrification planning

	<i>Existence</i>	
1.2.1	Is there an officially approved national electrification plan?	(Y)
1.2.2	Is there a specific rural electrification master plan?	(N)
1.2.3	Are the documents and their updates publicly available?	(N)
1.2.4	Is there a time frame defined in the electrification plan?	(Y)

1.2.5	Is there a timeline for review of the plan? (regular update of electrification plan (< 5 years))	N
1.2.6	When was the last update of the electrification plan?	2016
1.2.7	Is there an institution responsible for tracking progress of the plan?	P
	Scope	
1.2.8	Are targets in line with regional / international commitments? (e.g. ECOWAS, AU2050)	(Y)
1.2.9	Does the plan target a service level? (e.g., power availability, guaranteed hours of power supply, etc.)	(N)
1.2.10	Does the (rural) electrification plan include both grid and off-grid?	P
1.2.11	Is the assessment based on a market study (validated through a stakeholder workshop) establishing current and projected demand and a least-cost analysis?	(N)
1.2.12	Does the plan outline priority areas for off-grid electrification based on integrated economic and energy planning?	P
1.2.13	Does the plan consider population density?	Y ¹²
1.2.14	Does the plan consider geographic equity?	Y
1.2.15	Does the plan include community facilities?	(Y)
1.2.16	Does the plan include productive uses?	(N)

1.3 Grid extension planning

1.3.1	Is there a grid extension plan?	P
1.3.2	Is the plan publicly available?	P
1.3.3	Are there geospatial maps conveying the time frame of planned grid extension?	Y
1.3.4	Is there a provision for periodic review?	P
1.3.5	When was the last update undertaken?	2016
1.3.6	Is there an institution responsible for tracking progress of the plan?	P

1.4 Availability of data

1.4.1	Do periodic energy surveys exist?	P
1.4.2	Is there an institution responsible for these surveys?	Y
1.4.3	Are there provisions for regular updates?	N
1.4.4	When was the information last updated?	?
1.4.5	Do the surveys provide information on:	
	1.4.5.1 Number, size, incomes and geographic location of households, administrative and social institutions (principally educational and health centres) and businesses	?
	1.4.5.2 Sources and capital costs of acquiring energy services – e.g., electricity connection charges and wiring costs, appliances used and costs, etc.	?
	1.4.5.3 Operational (monthly or annual) costs of energy paid by consumers for different end-uses	?
	1.4.5.4 Percentage of income spent on energy services classified by geographic location (rural and urban)	?
	1.4.5.5 Proximity to the national grid	?

¹² 1.2.13 & 1.2.14 – the plan takes these elements into account through the focus on district capital cities.

2. Legal Framework for Mini-Grid Operations

Key findings:

- The draft SLEWRC Mini-grid regulations provide a significant step forward in establishing a legal framework for mini-grid operations. The document, if approved by the Parliament, will assign an extensive mandate to the SLEWRC. Ensuring the successful implementation and functioning of the regulations will depend on the availability of resources and capacity at the Commission.
- Provisions for grid arrival are outlined in the regulations. This is an important step in providing a degree of predictability for private developers. The first such case will serve as a litmus test for the robustness and enforcement of the measures outlined in the regulations.
- Ensuring transparency and accountability in the application of the regulations will also be crucial. For example, the transparency of the governance process for mini-grid licence approval is not fully clear. Clarification is required, with the information made publicly available, about how the committee for assessing licence applications would be selected and how to ensure their independence. Similarly, it is important to ensure that all relevant information outlining the licensing procedures, timelines and costs, is available on the Commission's website and is regularly updated.
- The nature of the licence application process requires effective inter-agency and inter-ministerial collaboration. This will ensure the timeliness of the different steps that are part of the overall licence application process, as well as efficient exchange of information to facilitate effective decision making.
- To ensure the efficiency of the overall licence acquisition process, clear timelines need to be defined for acquiring accompanying documentation, such as environmental permits.

Overview:

The draft SLEWRC Mini-grid regulations developed in 2018 are currently undergoing the final stages of the public consultation process and are expected to be submitted for parliamentary approval in Q1 of 2019. The development of the regulations had been identified as a priority action in the *Updated Electricity Sector Roadmap*. Once in place, the regulations will not only provide an official legal basis, but also a strong framework for liberalising private sector-driven mini-grid market development in Sierra Leone. In the short-term, effective implementation of regulations is a pre-requisite for advancing the RREP programme¹³.

Licensing requirements and processes are differentiated by mini-grid size. This is a positive approach that can level the playing field and encourage the development of a competitive market environment in which smaller developers are expected to enter. The timelines for licence application review and the communication of decisions are clearly defined, in line with international best practice. According to the current draft, the Commission would be obliged to confirm the receipt of a licence application within 15 days from its submission and communicate the final decision on the application outcome within 30 days. In practice, the implementation of this timeframe will depend on the existing capacity and training opportunities available to the SLEWRC's staff. To ensure the efficiency of the overall licence approval process, procedures for acquiring further documentation should also be timed. This relates to decisions made by other government agencies that are relevant for the licence application process, for example, a

¹³ The programme is currently entering the implementation of its second work package, which is expected to see private sector-driven development of 40 large-scale mini-grid projects.

permit, permission, licence, approval or similar document (as required) to be granted by the Environmental Protection Agency (EPA) to ensure the environmental integrity of the proposed project.

The modalities of the licensing process as outlined in the current draft regulations envision a one-stage process. While this allows for quick processing under current circumstances, in the medium term, a transition to a multi-stage licensing process might be considered in order to attract private investor initiatives beyond Government-led international tenders (see Box 1).

In the case that the main-grid utility's network arrives to an area already served by the mini-grid, the draft regulations outline provisions for mini-grid interconnection. It also contains regulations to inform the decision of a full mini-grid licensee to extend its distribution network to an area served by a basic mini-grid licensee. This is an important step in providing a degree of predictability for private developers. The first such case will serve as a litmus test for the robustness and enforcement of the measures outlined in the regulations.

The draft regulations assign an extensive and crucial role for the SLEWRC. Ensuring independence and enough human resource capacity will be crucial for the Commission to build a strong profile and trust with the private mini-grid developers. Transparency in applying the new regulations will also play a critical role in building this trust. For example, the governance process for mini-grid licence approval, as outlined in the current draft regulations, is not fully clear. Publicly available information on the license application assessment and selection process is needed to underscore the Commission's independence and transparency. Similarly, while the draft regulations indicate that the Schedule of Fees for mini-grid licences is publicly available, it is not currently possible to access this documentation on the Commission's website.

Box 1. A multiple-stage licensing approach

As is highlighted by indicators in 2.2 (see particularly 2.2.3 – 2.2.6), in certain cases, the establishment of a multiple-stage process for obtaining a mini-grid licence could be considered. Under such a system, the full licence acquisition process would be divided into several stages with clear timelines, benchmarks and actions in each stage.

For example, a *pre-licensing phase* could include an initial screening by the responsible institution to establish site availability and developer credibility. The site availability is verified by checking land ownership, as well as the existence of any ongoing application processes or existing approvals. Developer credibility can be assessed based on the information provided in the initial project concept proposal submitted to the responsible institution. The evaluation should focus on the technical and administrative capability of the developer, as well as the financial and economic viability of the proposal (i.e. whether the developer has sufficient equity and debt financing to supply the capital required to fund the capital expenditure (CAPEX) costs and whether the sources of the funds are clearly indicated and deemed credible). If the site is available and the initial assessment of developer credibility is positive, a provisional licence or approval would be granted. Such approval would provide exclusivity, an effective monopoly for the developer over the project site for a specified period to conduct the activities required to support the subsequent licence application (feasibility studies, community consultations; land acquisition, financial structuring, etc.) (Tenenbaum et al., 2014; Franz et al., 2014; Economic Consulting Associates, & Practical Action (Southern Africa), 2013).

The benefits of the approach are two-fold. For project developers, it minimises risks and, hence, limits potential costs. From the regulator's perspective, the early assessment of the credibility of a developer limits the number of weaker applications at later stages. The challenges for the implementation of a stage licensing approach stem from the increased human resource capacity requirements on behalf of the regulator.

Currently, most mini-grid developments in Sierra Leone are taking place within the scope of the RREP project, in line with the identified priority mini-grid sites and under Government-driven coordinated planning process. In this context, the multiple-stage licensing approach may not be considered a priority. However, as the market

develops, with the increasing number of private sector actors and developers looking for potential mini-grid sites beyond those identified for the RREP project, the benefits of a multiple-stage licensing approach could increase thus prompting a potential revision of the mini-grid regulations.

Preliminary assessment of the current situation

2.1 Legal basis for mini-grids

2.1.1	Are mini-grids legally allowed to operate in the country?	Y
2.1.2	Is eligibility to apply for mini-grid development clearly defined and inclusive?	Y
2.1.3	Can mini-grids be owned and operated by private operators?	Y
2.1.4	Do the regulations detail procedures for consumers to get connected to mini-grids?	Y
2.1.5	Do the regulations differ by size of mini-grids (is there a simplified registration for systems under a specified capacity size)?	Y

2.2 Licensing / permitting process

2.2.1	Is there a clear system in place with transparent criteria for obtaining a licence / construction & operation permits?	Y / N
2.2.2	What is / are the responsible institution(s) for licensing?	SLEWRC
2.2.3	Is there a provision for a resource verification / initial screening by the responsible institution to establish whether the proposed site is potentially available?	(N)
2.2.4	Is a pre-feasibility study required to support the application?	N
2.2.5	Does the pre-feasibility study need to be performed by experts approved by the regulatory institution?	N/A
2.2.6	Is the process divided into provisional and final approvals?	N
2.2.7	Do general business / environmental approvals come before final electricity sector approval?	(Y)
2.2.8	Are approvals and permits time-bound for each stage of the process? (provisional permit, energy licence)	P
2.2.9	Are clear milestones set that the developer must achieve? (i) In order to apply for a licence agreement (ii) in order to comply with a licence agreement	Y / N
2.2.10	Is there a monitoring process in place to track their progress?	N
2.2.11	Are there provisions for modifications of a granted licence?	Y
	2.2.11.1 Change of name or shareholding structure	Y
	2.2.11.2 Renewal of licence	Y
	2.2.11.3 Transfer of assignment of licence	Y
	2.2.11.4 Revocation of a licence	Y
2.2.12	Is there a process for re-applications?	(Y)
2.2.13	What is the number of procedures required for a mini-grid developer to set up a new facility?	?
2.2.14	Is there a time frame for approval set out in the regulations? (for each individual stage of the process)	Y
2.2.15	How many days does it take to obtain a generation licence?	(30)
2.2.16	How many days does it take to obtain environmental clearances?	?
2.2.17	How long does it take to obtain authorisations from ministries, public agencies, local entities and municipalities? (average duration in days per document)	?
2.2.18	What is the average cost of permits? (normally defined by the length of process)	?
2.2.19	How are the members of the review / approval committee selected?	?
2.2.20	Are there provisions for the regulator to use information and decisions by other government agencies in its final approval for a licence or tariffs?	(Y)
2.2.21	Are there provisions for monitoring and review of the existing mini-grid regulations?	N

2.3 Legal provisions for grid extension

2.3.1	Do regulations clarify what will occur when the interconnected grid reaches a mini-grid?		Y
	2.3.1.1	To convert from a power producer to a power distributor that buys electricity from the interconnected grid and resells to its local customers	N
	2.3.1.2	To sell electricity to the interconnected grid operator and no longer sell electricity to retail customers	Y
	2.3.1.3	To sell its distribution grid to the interconnected grid operator and receive compensation for the sale of the asset	Y
	2.3.1.4	Other	N/A
2.3.2	Are the outlined provisions enough to guide the stakeholders in the process?		?

2.4 Standardised regulatory instruments

2.4.1	Do standardised regulatory instruments exist?		Y
2.4.2	Is there a standardised power purchase agreement? (for both grid-connected and off-grid mini-grids)		(N)
2.4.3	Is there a standardised methodology for calculating tariffs?		Y

3. Funding and Economic Regulation

Key findings:

- The draft mini-grid regulations outline a new system for setting cost-reflective tariffs that is largely in-line with international best practice. It is now crucial to ensure their effective implementation.
- The RREP is the key support programme, implemented by the Ministry of Energy with the support of the United Nations Office for Project Services (UNOPS) and a funding grant from the United Kingdom Department for International Development (UK DFID). The programme is catalyzing mini-grid development in Sierra Leone. However, beyond the priority sites under the RREP, identifying additional commercially viable areas for mini-grid development is likely to be challenging and will require additional support measures.
- The establishment of a Rural Electrification Fund is being considered – the current state of play is unclear. If such a fund is established, it would be helpful to include mini-grid-specific modalities. In the design of support mechanisms for mini-grid developers, the Government may also encourage the development of productive uses linked with the arrival of mini-grids.
- While acknowledging the need for cost-reflective tariffs, the overall willingness-to-pay (WTP) and ability-to-pay (ATP) of the prospective consumer should also be considered. It is important that the SLEWRC continually monitors and thereby creates an understanding of both the cost of electricity and the WTP across the country. This information should be communicated to the MoE to inform electricity sector planning.

Overview:

The draft mini-grid regulations outline a new system for setting cost-reflective tariffs which aims to allow the developers to recover their total capital and operating costs. This is a key issue for small scale private mini-grid developers as it underlines the financial sustainability of a project and/or a business. The SLEWRC will hold responsibility for validating individual tariffs, using the calculation tool developed with the technical assistance provided under the Work Package 3 of the RREP programme (supported by

UNOPS). The use of a standardised calculation tool is a positive step towards ensuring a uniform, transparent and effective process of tariff setting for individual mini-grid projects.

The importance of cost-reflective tariffs for mini-grid developers is underlined by the recent priority mini-grid development site assessment conducted under the scope of the RREP project. The assessment concludes that under a regulatory system where cost-reflective tariffs are allowed (as envisioned under the current draft regulations), 90 project sites would not require any additional public funding (or capital expenditure (CAPEX) grants, nor cross-subsidies) for the 20-year project duration envisioned (UNOPS n.d.). However, finding additional economically viable sites beyond those identified and earmarked for the RREP is likely to be challenging and will require additional support measures.

While acknowledging the need for cost-reflective tariffs, the WTP and ATP of the households and businesses being served should also be considered. It is important that the SLEWRC continually monitors and develops an understanding of both the cost of electricity and the WTP across the country. This information needs to be communicated to the MoE to inform electricity sector planning. A good example is the recent WTP study, conducted with the support of the MCC, which provides critical up-to-date information on the WTP and ATP of urban households for connection and improved electricity access (ASI 2017). Similarly, studies conducted under the RREP in the areas selected for mini-grid development within the scope of the programme conclude that the ATP in the selected communities (which considers the current level of expenditure) is within the limits of an average cost-reflective tariff (UNOPS n.d.).

An effective monitor of the cost of electricity should include all relevant indicators that comprise the full cost for both off-grid and grid-connected customers. When analysing the cost of mini-grid supplied electricity for rural communities, it is useful to apply a comparative assessment as looking at the cost of existing alternative energy supply in rural areas often highlights the benefits of mini-grid development. For example, baseline studies conducted under the RREP project have revealed that the overall cost of batteries, phone charging and fuel purchases used by rural communities was higher than the expenses for the same services provided by mini grids (UNOPS n.d.). A comparison of the cost of electricity for grid-connected customers to that of users of off-grid technology should consider all expenditures incurred by customers when securing back-up options, such as diesel generators, in areas with unreliable grid connection.

The National Renewable Energy Policy outlines a broad commitment to “introduce appropriate fiscal incentives for renewable energy” (MoE 2016). The RREP is currently the key mini-grid support programme, implemented by the Ministry of Energy with the support of UNOPS and a funding grant from the DFID. The programme is acting as a catalyst for mini-grid development in Sierra Leone through the provision of both financial and technical assistance. Under the Work Packages 1 and 1+, the focus was on developing 50 smaller, publicly funded mini-grid sites, with generation plans developed at Community Health Centres (CHCs)¹⁴. WP2 specifically aims to attract private sector investment in the sector for the electrification of an additional 40 communities. Under WP2, government subsidies will support the installation of the distribution network, with the generation assets to be financed by the private sector.

Beyond subsidies, additional fiscal policy measures can include low taxes for mini-grid developers, reduced import duties for mini-grid equipment or components and accelerated depreciation. Any support measure that targets off-grid electrification, including mini-grid development, should also be at least at

¹⁴ All assets were publicly funded, except meters which will be financed and provided by operators based on their respective business models (ibid.).

the level of conventional grid supply¹⁵ (Franz et al. 2014). This comparative approach should be used when designing the framework for financing support.

Under the framework of the Energy Compact signed between the Government of Sierra Leone and the Government of UK in 2016, a duty waiver was granted to all importers of solar products. It was subsequently put into law via the amendment to *the Goods and Services Act of 2009* outlined in the *Finance Act of 2017*¹⁶ (MoE 2017a). These documents set out a clear priority for solar RE technology. To level the playing field for private developers, duty exemptions should be technology neutral. This would be in the spirit of *the National Renewable Energy Policy* (MoE 2016), which provided a mandate for “*tax and duty exemptions for prospective investors in the renewable energy sub-sector*”, without specifying a technology preference. Nevertheless, it is important that detailed policy provisions are put in place to facilitate their effective implementation.

The decision of the Ministry of Energy on the establishment of a Rural Electrification Fund for co-financing priority projects (electricity access, renewable energy, and energy efficiency) is listed as one of the longer-term priority measures under the *Updated Electricity Sector Roadmap* (to be completed by 2020). It appears that the process is on hold and there has been no development in this direction since the Roadmap came into force. If such a fund is established, it would be helpful to include mini-grid-specific modalities. The availability of additional financial support could be particularly relevant to support private sector-led mini-grid development beyond the scope currently identified under the RREP programme. Support for mini-grid developers could be in the form of loan guarantees or public lending to address access to finance, which is a key challenge for mini-grid developers, particularly local companies, in the ECOWAS region¹⁷. Government may also specifically encourage the development of productive uses linked with the arrival of mini-grids (see Box 2).

Box 2. Productive use of electricity (PUE): linking rural electrification and economic development

The links between energy use, economic growth, and level of development are increasingly well documented. Energy can act as an enabler for income generation, hence promoting socio-economic development. Gaining access to reliable modern energy sources can significantly expand the opportunities for rural entrepreneurs, allowing them to upgrade their businesses across the value chain. From the other side, demand for electricity from small industry and businesses is a key factor for reaching the needed critical revenue to ensure financial sustainability of mini-grids. This highlights the virtuous circle associated with the promotion of productive uses of energy (PUE).

The concept of PUE (or PURE where it is specifically referred to renewable energy) can be defined as ‘activities that generate income, increase productivity, enhance diversity, and create economic value through the consumption of electricity’ (Booth et al. 2018). Research increasingly suggests that the increase of productive use is not always automatic; equally PUE does not always lead to an increased firm performance. Promotional activities and mentoring support for entrepreneurs are important, as are building their commercial and technical skills, helping them understand the full value chain of their businesses and identify new opportunities with the addition of PU (ibid; Mayer-Tasch et al. 2013; Bruderie et al. 2011).

Mentoring could be provided by governments, non-governmental organisations, or developers themselves if they had the necessary capacity and knowledge. The multi-dimensional nature of the PUE requires the involvement of institutions with competences in the energy sector, specific types of productive technologies, as well as local

¹⁵ As measured based on financial support per kWh produced.

¹⁶ Par. 28: a duty exemption for the “*importation and sale of Photovoltaic System Equipment and low energy or energy efficient appliances that meet relevant International Electro-Technical Commission (IEC) global standards*”.

¹⁷ Notably, the mandate for such support measures is outlined in the NREP, which proposes “*establishing framework for the use of Sovereign Guarantees to support appropriate renewable energy projects*” (the type of projects is not further specified) (MoE 2016; vii; p.20).

economic development. It is often the case that such expertise lies across different institutions (Bruderie et al. 2011). Hence, for the public sector to play an effective role in supporting PUE, collaboration across the technical areas and levels of government is particularly important. Such a coordinated approach should also be applied to government’s engagement with the donor community, where support for PUE could be incorporated into programmes supporting private sector, local economic development, and agriculture development programmes. Businesses involved in mini-grid development should also be encouraged to develop a PU strategy tailored to the needs of the community and their specific business model (Booth et al. 2018).

One of the key challenges is access to finance for small businesses with little or no financial track record. Some developers choose to set up their own financing schemes (e.g. to offer concessionary loans – an approach used by Jumeme, Rafiki Power, and PowerGen in Tanzania (Booth et al. 2018)). Others choose to partner with microenterprises to be able to offer financing to entrepreneurs willing to invest in PUE (e.g. the partnership between Mwenga Power and a local microfinance institution—the Mama Bahati Foundation—that provided loans to some of the Mwenga customers for asset finance in Tanzania (ibid.)). In such cases, it is important that the regulatory framework allows favourable conditions that allow developers to offer loans. However, not all developers have the resources and/or experience to facilitate financing for productive use activities. The availability of support from NGOs or government programmes supporting small business can make a significant positive impact. For example, the design of the Rural Electrification Fund (as envisioned under the Updated Electricity Sector Reform Roadmap 2018-2030 (MoE 2018)) could include modalities that focus on facilitating access to finance for PUE.

Preliminary assessment of the current situation

3.1 Tariff setting

3.1.1.	Are mini-grid operators legally allowed to charge a different tariff from the national tariff?	Y
3.1.2	Is there a retail electricity tariff schedule for mini-grids?	N
3.1.3	Who is defining the tariff?	SLEWRC with GOSL
3.1.4	Is there a clear methodology / calculation tool for determining the tariff for mini-grid operators?	Y
3.1.5	Does the calculation take into account the following . . . ?	
	3.1.5.1 Fixed costs	Y
	3.1.5.2 Variable costs	Y
	3.1.5.3 Revenue	Y
	3.1.5.4 Load curve	(Y)
	3.1.5.5 Deferred loads	(N)
	3.1.5.6 Consumer income profiles	(N)
	3.1.5.7 Willingness to pay	(N)
3.1.6	Are developers allowed to recover the administrative and financing costs of providing loans to actual or potential customers that will allow the customers to connect to the mini-grid and to facilitate productive uses of electricity?	(Y)
3.1.7	Is there a transparent procedure for approval of the tariff?	P
3.1.8	How long does it take to obtain the approval of a tariff?	?

3.2 Affordability

3.2.1	Is there information available on the annual cost of subsistence consumption (30 kilowatt-hours per month) as a percentage of gross national income per household of the bottom 20% of the population?	N
3.2.2	Is there a clearly defined policy on affordability? (e.g., percentage of income spent on an ongoing basis)	N
3.2.3	Is there a mechanism to support low-volume consumers? (cross-subsidisation, social or lifeline tariff)	(N)
3.2.4	Is there a subsidy for lowering connection costs?	P

3.3 Financial incentives for suppliers

3.3.1	Are there publicly funded mechanisms to secure viability gap funding for operators?	Y
3.3.2	If there are, are they one-time subsidies?	Y
3.3.3	Do subsidies exist for:	
	3.3.3.1 Mini-grids	P
	3.3.3.2 Power generators	P
	3.3.3.3 Solar modules	P
	3.3.3.4 Energy storage systems	(N)
	3.3.3.5 Distribution systems	Y
	3.3.3.6 Monitoring systems	N
	3.3.3.7 Safety equipment	?
	3.3.3.8 Other equipment related to mini-grids	(N)
3.3.4	If subsidies for mini-grids exist, are they:	
	3.3.4.1 Set on a fixed basis?	Y
	3.3.4.2 Set on a competitive basis based on a number of connections and minimum level of service?	P
3.3.5	Do subsidies include in-built performance-based provisions?	?
3.3.6	Do duty exemptions exist for ¹⁸ :	
	3.3.6.1 Mini-grid systems	(N)
	3.3.6.2 Power generators	P
	3.3.6.3 Energy storage systems	P
	3.3.6.4 Distribution systems	(N)
	3.3.6.5 Monitoring systems	(N)
	3.3.6.6 Other equipment related to mini-grids	N
3.3.7	Are there specific mechanisms to support lending to mini-grid developers, such as:	
	3.3.7.1 Policy / regulatory measures?	N
	3.3.7.2 Financial measures? (e.g., loan guarantees, public lending)	N
3.3.8	Is the role of the regulator in the implementation of subsidies clearly defined?	Y
3.3.9	Is there a system in place for monitoring the use of support mechanisms – the disbursement of funds and results achieved?	N
3.3.10	Is it clear which institution is responsible for the review?	P

¹⁸ Based on the Finance Act of 2013, which established provisions for duty-free concession / tax exemption on imported renewable energy appliances and equipment (GoSL 2013).

4. Standards and Quality

Key findings:

- The draft mini-grid regulations outline key requirements for the quality of service provided, as well as health and safety guidelines, including environmental protections.
- The regulations also include robust requirements for the use of internationally certified electricity measurement devices, but not for other types of equipment.
- The availability of low-quality products and installations remains a critical challenge in Sierra Leone. It undermines consumer and professional confidence in solar technology. Moving ahead, there is a need for further work in this area, with a priority for the adoption of international quality standards and in-country certification. Inter-agency co-ordination will be crucial. Recent technical assistance provided to the Renewable Energy Association of Sierra Leone (REASL) proposes a pathway towards the development of a Standard and Quality Assurance Regulatory Framework Ecosystem (Hankins 2017).

Overview:

The draft mini-grid regulations' section on consumer service rules outlines key requirements for the quality of service provision, as well as health and safety guidelines. The regulations in this area are differentiated by mini-grid size, with less demanding requirements for basic mini-grid licensees. Standardised templates for reporting are provided in the annex of the draft regulations. To ensure accountability, specific reporting requirements are outlined in the draft. However, the successful implementation of the standards and quality regulation will depend on effective monitoring framework, which will require adequate human resource capacities.

The draft regulations acknowledge the authority of the Environmental Protection Agency of Sierra Leone (EPA-SL) in developing the environmental protection standards and assessing compliance of the mini-grid licence applicants and existing licensees. This highlights the importance of effective inter-agency collaboration. UNOPS, in collaboration with the EPA, has developed draft Guidelines for Environmental and Social Impact Assessments of Renewable Energy Technologies and Mini-grids (UNOPS n.d.). The Guidelines aim to establish appropriate standards and provide guidance to mini-grid project developers. It is acknowledged that the categorization and regulation of renewable and mini grid projects under the current EPA Act is not compatible with the current regulatory framework being developed (ibid.).

The availability of low-quality products and installations on the market undermines consumer and professional confidence in solar technology. Testing and certification of mini-grid equipment to make sure they meet international standards is a big challenge. Moving ahead, there is a need for further work in this area, with a priority for the adoption of international quality standards and in-country certification. ECOWAS/ECREEE is the organisation leading the development of a high-quality harmonised standard system across the West Africa region. It would be beneficial for any work in this area to be in line with the regional initiatives and build on the ECREEE work previously undertaken in Sierra Leone with the aim of establishing a national centre of competence for renewable energy standards and certification.

Capacity building is also essential to the development of new regulatory measures to develop local expertise in quality assurance and strengthen the performance of the Sierra Leone Standards Bureau. Inter-agency co-ordination (particularly between the Sierra Leone Standards Bureau working in line with REASL) will be crucial for the development and implementation of standards. Recent technical assistance provided to the Renewable Energy Association of Sierra Leone (REASL) proposes a pathway towards the development of a Standard and Quality Assurance Regulatory Framework Ecosystem (Hankins 2017).

Preliminary assessment of the current situation

4.1	Are there technical standards detailing the requirements for mini-grids to connect to the grid?	Y
4.2	Are technical standards made publicly available?	N
4.3	Are there safety standards for mini-grids?	Y
4.4	Are national standards in line with international best practice?	P
4.5	Are these safety standards made publicly available?	Y
4.6	Does the government implement certification programmes for mini-grid installers?	N
4.7	Does the government provide or endorse certification programmes for one or more components or equipment required for mini-grids?	(Y)
4.8	Has the government adopted international testing methods?	N
4.9	Does the regulation accept testing done elsewhere / in another country (versus in-country testing required)?	Y
4.10	Is there a clear system for setting and reviewing the standards and certification requirements?	N
4.11	Is there a system in place for a periodic review of the standards?	(N)
4.12	When was the last time a review was conducted?	?
4.13	Are there clearly defined co-ordination mechanisms between the energy sector regulator and related standard-setting institution(s)?	?

5. Governance and Administrative Effectiveness

Key findings:

- A preliminary overview of governance indicators mainstreamed across the four preceding pillars highlights an uneven approach in establishing measures to ensure transparency as well as monitor the implementation of policies and regulations.
- Energy sector planning requires effective inter-agency collaboration across various levels of government. This is particularly relevant for rural electrification given its potential to enable socio-economic development in areas of the country that are hard to reach. Currently, multi-level cross-sectoral collaboration remains a challenge in Sierra Leone. It is important that this remains a key focus throughout policy and action plan implementation.
- The draft SLEWRC Mini-grid Regulations (SLEWRC 2018) represent a significant step forward in creating a market conducive to private sector-led mini-grid development in Sierra Leone. Once approved by the Parliament, timely implementation will be critical for the regulations to deliver the anticipated results. Development of SLEWRC capacities at the technical level and, subsequently, on the retention of institutional knowledge is also important.
- The Updated Electricity Sector Reform Roadmap (2018-2030) (MoE 2018) envisions that a Rural and Peri-Urban Electrification Authority could be established. Given the speed of energy sector reform required and the limited available resources, it may be more efficient in the short to medium-term to focus on capacity building within existing institutions and agencies, with the rural electrification department at MoE leading on policy and statutory instruments and the EDSA and SLEWRC leading the implementation. Particular attention needs to be paid to avoid the overlap of responsibilities among these institutions.
- It is also important that the monitoring mechanisms/structures for various policies, strategies and action plans supporting the development of the energy sector be harmonised and adhere to the monitoring framework envisioned under the Electricity Sector Roadmap.

Overview:

Given the multi-dimensional nature of rural development and rural electrification policies, ensuring strong cooperation between different technical areas and levels of government is very important. This is particularly relevant for rural electrification given its potential to enable socio-economic development in areas of the country that are hard to reach. The need for coordinated action across several ministries, departments and agencies (MDAs) is noted in the National Renewable Energy Policy, which also “*seeks to empower the relevant ministries, departments and agencies of the Government of Sierra Leone, Local Councils and Development Partners to adopt and develop any of the policies, which are tested around the world, and to make effort to support, promote and incentivize entry of renewable energy in the country*” (MoE 2016). The design of the RREP programme is a good example of a multi-stakeholder partnership, including inter-ministerial collaboration across different levels of government¹⁹.

Overall, however, cross-sectoral multi-level collaboration remains a key challenge in Sierra Leone and thus requires a sustained focus throughout policy/action plan implementation. The PUE concept highlights the links between rural electrification and economic development planning, further underlining the importance of inter-ministerial collaboration (see Box 2). A broader engagement of local governments in the planning of off-grid electricity supply services, in line with the Local Government Act of 2004 (GoSL 2004), would ensure that local knowledge forms the basis for an effective and sustainable sector development. Local governments also play an important role in ensuring stronger community engagement, which is among the key aspects for successful mini-grid development.

Regarding the assignment of responsibilities, the reviewed documents often identify the responsible institution, but do not detail the specific department or team. In this case, our assessment is ‘P’ for “only partly addressed.” The lack of effective internal division of responsibilities can limit the effectiveness or delay successful implementation of policies and regulations. This could be exacerbated through lack of human resource capacity and training opportunities.

Continuous human resource capacity building within the SLEWRC and the MoE is crucial to ensure the effective implementation of the new laws and regulations. The new draft SLEWRC Mini-grid Regulations envision a strong role for the Sierra Leone Electricity and Water Regulatory Commission (SLEWRC), including setting cost-reflective tariffs for full mini-grids and tariff adjustment. In this regard, the independence and capacity of the Commission are integral and need to be ensured. Development of capacities at the technical level and, subsequently, on the retention of institutional knowledge is of high importance. The continuous engagement and responsiveness of the regulator is also important to facilitate the tariff adjustment measure. The Renewable Energy Action Plan (MoE 2015) and Policy (MoE 2016) include provisions for capacity building of staff working in the energy sector, including specifically on mini-grids. It is unclear to what extent the capacity-building activities have taken place, and whether they have delivered the anticipated results.

The effective functioning of the Steering Committee for the implementation of the *Electricity Sector Reform Roadmap* is particularly important for the future development of the mini-grid market in Sierra Leone, given the broad scope of its oversight responsibilities. The role of the Steering Committee is especially relevant for the advancement of indicators under pillar 1 of the holistic mini-grid support framework which encompasses key national energy sector planning policies and strategies. This is due to

¹⁹ To support the implementation of the RREP, an official partnership was developed between the Ministry of Energy, the Ministry of Health and Sanitation (MoHS), and the Ministry of Local Government and Rural Development (MLGRD). The key focus is on project oversight, which includes the establishment of local by-laws to support the regulatory framework for rural electrification on the local level.

its responsibility to oversee the implementation and continuous review of key strategic documents for electrification and grid extension planning.

As the development of the SLEWRC Mini-grid Regulations forms part of the Roadmap, its implementation monitoring falls under the mandate of the Steering Committee. In line with the Roadmap, SLEWRC, as the body responsible for the implementation of the regulations, will be expected to produce monthly reports on the implementation progress, to be submitted to the Committee. While the SLEWRC Mini-grid Regulations are going through the ratification process, it is important that the SLEWRC begins to put in place an implementation strategy outlining clear responsibilities, assigning enough staff and including clear timelines for the regulations to become fully operational. A monitoring framework may also be designed to track the implementation of the new regulations over the following few years. This should be done in accordance to the reporting requirements to the Steering Committee overseeing the implementation of the broader Electricity Sector Reform Roadmap.

The Roadmap envisions that the SC could be integrated into the structures of the MoE. Should this path be pursued, it seems important that the process does not negatively affect the current multi-stakeholder nature of the Committee.

Preliminary assessment of the current situation

5.1 Stakeholder role clarity

5.1.1	Is there a clear division of responsibilities?	P
5.1.2	Is there an institution assigned to “champion” mini-grid market development in the country?	P
5.1.3	Does this institution act as a one-stop centre through which both energy and non-energy approvals are processed?	N
5.1.4	Are there structures in place to facilitate cross-institutional collaboration?	P
5.1.5	Do all stakeholders recognise the jurisdiction of the regulator's authority?	P
5.1.6	Are there mechanisms in place for community engagement / consultation?	P
5.1.7	Is there a mechanism in place for communities to file grievances and instigate changes?	Y
5.1.8	Does the regulatory body have a high level of (financial) independence?	?

5.2 Capacity needs and technical assistance

5.2.1	General public	
	5.2.1.1 Do public awareness raising programmes exist?	?
5.2.2	Mini-grid developers	
	5.2.2.1 Do user-friendly guidelines exist for the development of small power projects?	(N)
	5.2.2.2 Has the development of guidelines included a stakeholder validation?	N/A
	5.2.2.3 Are guidelines publicly available?	N/A
5.2.3	Workforce	
	5.2.3.1 Do vocational training programmes exist?	Y
5.2.4	Public sector	
	5.2.4.1 Capacity assessment – does the regulatory body have well-trained staff?	P
	5.2.4.2 Do capacity building programmes for staff exist?	(Y)

CONCLUSIONS AND OUTLOOK

The report introduces an analytical framework outlining key elements of a holistic approach towards the development of the supportive policy and regulatory environment for the mini-grid sector. This framework, which can be used for the assessment of the status quo, as well as future planning of policies and strategies, rests on five closely interlinked pillars:

- High-level policy, market and technology assessment
- Legal framework for mini-grid operations
- Funding and economic regulation
- Standards and quality
- Governance and administrative effectiveness

The five-pillar framework was used as a basis for the analysis of the key current policies and regulations relevant for the development of the Sierra Leone mini-grid market. The ongoing work of major international technical assistance programmes has been considered, ensuring effective coordination of major ongoing processes supporting the development of the energy sector in Sierra Leone.

Since off-grid solutions were officially incorporated into the rural electrification planning, Sierra Leone has come a long way towards creating an enabling environment for the private sector-driven mini-grid development through policy and regulatory reform in the energy sector. For these efforts to deliver the anticipated results, maintaining the momentum of reform with a focus on shifting towards effective implementation, capacity building and robust progress monitoring is critical.

The analysis provided in this report could be used to inform the work of the Energy and Water Resource Commission as well as the Steering Committee for the implementation of the *Electricity Sector Roadmap*. The MoE, with the support of the MCC, is currently undergoing the process of designing an Action Plan for the implementation of the Electricity Sector Reform Roadmap. The work is structured under eight work packages. The key findings outlined in this report could form the basis for the design of the work stream focusing on the development of the off-grid sector in Sierra Leone.

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