



RENEWABLE ENERGY POLICY OF SIERRA LEONE

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FOREWORD

The present trend towards environmentally sustainable energy utilization is a response to global climate change. Sierra Leone can also benefit from falling global prices for renewable energy technologies, making better use of indigenous energy resources and cutting reliance on imported fossil fuels. This, coupled with market incentives to promote renewable energy technologies, can make this trend a reality in Sierra Leone as there are unexploited renewable energy resources which could make a substantial difference to energy access and power production.

It is in this context that the Ministry of Energy is committed to this policy document which is intended to give much needed thrust to renewable energy; a policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy.

To achieve this aim Government is setting as its target 4,703 Ktoe/annum (79.7%) and 8,950 Ktoe/annum (84%) of renewable energy contribution to final energy consumption by 2020 and 2030 respectively, to be produced mainly from biomass, solar, hydro and wind. The renewable energy is to be utilized for power generation and non-electric technologies such as solar water heating and bio-fuels. This is in addition to the estimated existing (in 2011) renewable energy contribution of 1,276 Ktoe/annum which was mainly from fuelwood and hydro.

Some of the main benefits of the policy will be renewable energy for rural communities, far from the national electricity grid, remote schools and clinics, energy for rural water supply and desalination, and solar passive designed housing and solar water heating for households in urban and rural settings and commercial applications. Large-scale utilization of renewable energy will also reduce the emissions of carbon dioxide, thus contributing to an improved environment both locally and worldwide.

As part of Government strategy and policy programs in promoting integrated sustainable rural development, renewable energy needs seek to assume a significant role in supporting economic

development. However, the Government is seriously pursuing access to electricity to both urban and rural areas which will result in an improvement in the quality of lives of the populace. It is for this reason that the Government is also introducing decentralized mini-grids and hybrid systems in rural areas that will also promote the development of small, medium and micro enterprises (SMMEs) through the involvement of the private sector.

Government is committed to the introduction of greater levels of competition in electricity markets. Promoting renewable energy will contribute towards the diversification of electricity supply and energy security. In doing so, Government has created an enabling environment to facilitate the introduction of independent power producers that generate electricity from renewable energy sources. To complement the energy sector reforms, the ministry of energy will ensure greater investment by the private sector in renewable energy power producers, and in the commercialization, development of local renewable energy technologies and manufacturing of up to standard quality of renewable energy equipment/ appliances.

Within the renewable energy division, the Ministry of Energy will develop human capacity building programs to strengthen both formal and informal levels. This policy document is intended to support the development of training centres with the objective of enhancing human resource development and thus promoting socio-economic development. Government will also establish integrated energy centres that will bring technologies and energy services closer to disadvantaged communities, as well as disseminate information and create awareness about renewable energy.

Amb. Ing. Henry O Macaulay
Minister of Energy

ABBREVIATIONS

AfDB	African Development Bank
AfP	Agenda for Prosperity
AU	African Union
BHP	Bumbuna Hydro Power
CEF	Central Energy Fund
CFL	Compact Fluorescent Lamp
CLSG	Côte d'Ivoire, Liberia, Sierra Leone, Guinea
CSP	Concentrated Solar Power
DoE	Directorate of Energy
ECREEE	ECOWAS Commission for Renewable Energy & Energy Efficiency
ECOWAS	Economic Community of West African States
EDSA	Electricity Distribution and Supply Authority
EE	Energy Efficiency
EEEP	ECOWAS Energy Efficiency Policy
EFA	Environmental Foundation for Africa
EFO	Energy for Opportunities
EGTC	Electricity Generation and Transmission Company
EIB	European Investment Bank
EPA	Environmental Protection Agency
EREP	ECOWAS Renewable Energy Policy
EU	European Union
EUEI-PDF Facility	European Union Energy Initiative-Partnership Development Facility
EWRC	Electricity and Water Regulatory Commission
FAO	Food and Agriculture Organization
FD	Forestry Division
FDI	Foreign Direct Investments

FiT	Feed-in Tariff
GDP	Gross Domestic Product
GDR	Generation Disclosure Requirement
GEF	Global Environmental Facility
GOSL	Government of Sierra Leone
GWh	Giga Watt hour
IRP	Integrated Resource Plan
KfW	Kreditanstalt für Wiederaufbau
Ktoe	Kilo Tons of oil equivalent
Kv	Kilovolt
MAFFS	Ministry of Agriculture Forestry and Food Security
MDAs	Ministries, Departments, Agencies
MDG	Millennium Development Goals
M&E	Monitoring and Evaluation
MoE	Ministry of Energy
MoFED	Ministry of Finance and Economic Development
MoEST	Ministry of Education Science and Technology
MoLCPE	Ministry of Land Country Planning & Environment
MoLGRD	Ministry of Local Government and Rural Development
MFP	Multifunctional Platforms
MTA	Ministry of Transport and Aviation
MTI	Ministry of Trade and Industry
MW	Mega Watt
MWR	Ministry of Water Resources
NGOs	Non-Government Organizations
NREP	National Renewable Energy Policy
NREAP	National Renewable Energy Action Plan
NPA	National Power Authority
PBF	Public Benefit Fund
PFM	Public Financial Management
PPPs	Public-Private-Partnerships

PTC	Production Tax Credit
PV	Photo Voltaic
R&D	Research and Development
RE	Renewable Energy
RES	Renewable Energy Resources
RET's	Renewable Energy Technologies
SE4ALL	Sustainable Energy for All
SLE	Sierra Leone
SMMEs	Small Medium & Micro Enterprises
SPU	Strategy and Policy Unit
SSL	Statistic Sierra Leone
STTP	Solar Thermal Technology Platform
UNDP	United Nation Development Programs
UNFCCC	United Nations Framework Convention Climate Change
UNIDO	United Nations Industrial Development Organization
WACCA	West African Clean Cooking Alliance
WAPP	West Africa Power Pool
WAPP	West Africa Power Pool
WHH	Welthungerhilfe

EXECUTIVE SUMMARY

Sierra Leone is endowed with huge renewable energy potential which is grossly untapped and underutilized due to lack of government policy direction, financial resources and inadequate research and development of renewable energy technologies. High dependency on fossil fuel for electricity consumption (69%) and transport (100%) is causing huge burden on the national budget, coupled with problems of climate change, the environmental and the effect of greenhouse gas emission.

Consequently, it is essential that a coordinated, coherent and comprehensive National Renewable Energy Policy (NREP) be put in place to drive hydropower, bioenergy, solar and wind as energy sources. It is intended that the Renewable Energy Policy advanced in this document will serve as a blue print for the sustainable development, supply and utilization of energy resources within the economy for both grid and off-grid energy solutions.

About 60% of rural areas that are remote and have a low demand density will depend on off-grid energy solutions as the economies of grid deployment do not favour rural electrification. Off-grid areas will depend on alternative solutions. The implication of this strategy for improved energy supply across Sierra Leone will entail the utilization of renewable energy sources at our disposal, both on and off-grid.

It is also expected that this policy will drive the creation of market incentives for the deployment of efficient private sector-driven renewable energy solutions, for remote and off-grid areas. This policy strives to ensure that the renewable energy power supply for rural areas will be driven by Sierra Leone private sector, while Government will provide the framework and the financial guarantee for implementing the framework.

The Sierra Leone energy policy and the Agenda for Prosperity (AfP) (i.e. Poverty Reduction Strategic Paper III) highlighted the need for a renewable energy policy which would deal with issues like the electricity sector in the context of the on-going

electricity reforms, access to renewable energy resources and utilization of renewable energy sources. Based on the resource situation and the technological base of the country, this policy will focus on hydropower, bioenergy (biomass), solar and wind power plants and co-generation plants for energy production. The renewable energy policy will harmonize with the renewable energy policy of ECOWAS/ECREEE which will be implemented through a National Renewable Energy Action Plan (NREAP) of Sierra Leone.

A National Renewable Energy Policy is therefore needed and will be requested by foreign investors who wish to invest in the nation's economy based on a national program strategy instead of a project based approach. Many of the tools necessary to drive renewable energy development require important rule changes and coordinated action by several ministries, departments and agencies (MDAs), which are yet to be actualized. The Climate Scope tool which has recently included Sierra Leone in an assessment of the enabling environment for investment in clean energy could be one of such tool – see the Sierra Leone report at <http://global-climatescope.org/en/country/sierra-leone/#/details>. This Renewable Energy Policy mandates timely adoption of key regulations and rules.

The policy marks the initial steps of aligning the Sierra Leone renewable energy policy with the regional Renewable Energy Policy (EREP) of the ECOWAS. It therefore mandates the implementation of the National Renewable Energy Action Plan (NREAP). This steering framework is expected to boost access to energy services and ensure the sustainable growth of clean energy contribution to Sierra Leone's energy mix.

PARTICIPATING MDAs

	Authority
1	Ministry of Energy
2	Ministry of Trade & Industry
3	Ministry of Finance & Economic Development
4	Ministry of Justice
5	Ministry of Education, Science and Technology
6	Ministry of Lands, Country Planning & Environment
7	Ministry of Works, Housing & Infrastructure
8	Strategy and Policy Unit, Energy
9	Ministry of Agriculture, Forestry & Food Security
10	Environment Protection Agency
11	Ministry of Water Resources
12	Ministry of Local Government & Rural Development
13	Sierra Leone Institution of Engineers
14	Ministry of Social Welfare, Gender and Children's Affairs
15	Civil Society Representative

1.0 INTRODUCTION

1.1 Background

Energy consumption in Sierra Leone is dominated by biomass, which accounts for over 80% of energy used (EUEI-PDF, 2013; Tarawalli survey, 2014). The largest source of biomass energy is wood fuel followed by charcoal. Imported petroleum products are the next largest source of power at approximately 13%. Grid-generated electricity accounts for the remainder of the power supplied to the country's citizens. Wood fuel is the traditional form of energy and is used almost exclusively by households for cooking and craft activities. Petroleum, on the other hand, is the most important source of energy for the modern productive energy sector (including transportation and private electricity generation).

The Sierra Leone national energy policy document that was established in 2009 is government's policy direction on energy and its related components. Improved energy supply results in improved standards of living, which manifests in increased food production and storage, increased industrial output, provision of efficient transportation, adequate shelter, improved healthcare and enhancements in other human services.

Sierra Leone is naturally rich in primary renewable energy resources. These include renewable energy sources such as hydro, solar, wind and bioenergy (biomass). However, the economy has mainly depended on the consumption of petroleum product for commercial energy. The use of hydro-power plants, which entered the Sierra Leone energy scene in the late 1970's, now accounts for the first largest energy resource (Bumbuna Hydro Power) for electricity generation in the country, contributing approximately 85% of the total installed grid- connected generated energy.

Successful execution of the Sustainable Energy For All programs would mean to target on universal energy access, which includes both access to electricity as well as access to clean cooking. Access to clean cooking is either cooking with modern fuel, or as a minimum use of a more efficient cooking device – which would also contribute to energy efficiency targets. For Sierra Leone, increase access to electricity from 13% in 2013 to 82% by 2030, increase energy efficiency from 55% in 2013 to 91% by 2030 of electricity supply and double renewable energy level from 3,622 ktoe in 2013 to 9,315 ktoe by 2030. Importantly, these stated objectives of the Government of Sierra Leone (GoSL) align completely with the goals of the Sustainable Energy for All (SE4ALL) Initiative.

The level of energy consumption in the country has grown substantially between 2006 and 2013 from 1,349 ktoe to 3,926 ktoe respectively (EUEI PDF 2013, Tarawalli survey 2014). Nevertheless, there remains a huge gap of suppressed demand for energy especially in the electricity sub-sector. Economic expansion in mining, agriculture and industry is also accelerating demand.

The European Investment Bank (EIB) in collaboration with other donor partners namely: the World Bank, African Development Bank (AfDB) and Kreditanstalt für Wiederaufbau (KfW) are supporting the construction of 225KV Transmission Line [Conakry, Liberia, Sierra Leone and Guinea (CLSG)] through the West Africa Power Pool (WAPP) Project. This support is intended to usher in a strategic power market for the region and the efficient use of renewable energy resources when completed.

By its very nature, renewable energy is multi-sectoral and as such, should be taken into account by the finance, environment, trade and industry, agriculture, forestry, petroleum, education and public private partnerships sectors involved. It should be noted that the policy being developed will require the provision of financial support to ensure the growth and development of the renewable energy sector.

There will also be a need to develop strong and integrated steering frameworks which will boost access to renewable energy services. This policy framework will also ensure that there is growth of renewable energy contribution in Sierra Leone's energy mix.

Sierra Leone recognizes that the emissions of greenhouse gases, such as carbon dioxide, from the use of fossil fuels and petroleum products has led to increasing concerns worldwide about global climate change. While Sierra Leone is well endowed with renewable energy resources that can be sustainable, so far these have remained largely untapped. Correspondingly, it is the intention of the Government to make Sierra Leone's due contribution to the global effort to mitigate greenhouse gas emissions. For this purpose, the policy direction will create the framework within which the renewable energy industry can operate, grow, and contribute positively to the economy and to the global environment.

Finally, it cannot be over-emphasized that Sierra Leone is faced with pressing social problems such as poverty, unemployment and lack of access to health facilities. The utilization of renewable technologies, particularly in remote rural areas, where clinics and households will depend upon solar electricity for their power, women and children will need efficient biomass for cooking, have a potentially important role to play in tackling these important social issues.

1.2 Socio-economics of the Renewable Energy Policy

Since the end of the internal conflict in 2002, Sierra Leone has made significant progress in consolidating peace and security country-wide and in rebuilding its economy that was nearly destroyed by the decade-long conflict. The country has successfully implemented two medium-term development strategies that invested in peace and state-building mainly through consolidation and infrastructure enhancement and strengthening macroeconomic foundations by qualifying for debt relief under the Highly Indebted Poor Countries Initiative. The country is now classified as one of the world's top ten business reformers and is a net-recipient of millions of dollars in foreign direct investment.

However, poverty rates are still high despite reducing between 2003 (66%) and 2011 (53%) (Sierra Leone Economic Outlook, 2013)

Despite this notable progress, the underlying drivers of fragility continue to pose significant downside risks for the country's development. High rates of youth unemployment, at 70%, gender inequality, high levels of perceived and real corruption, weak human and institutional capacities and poor economic governance systems, especially public financial management (PFM) and revenue management systems, constrain the Government's capacity to implement its development agenda. Limited physical infrastructure, especially in energy, water supply and roads, inhibit inclusive and sustainable growth and limits the country's ability to implement its transformation agenda.

The application of renewable energy has the potential not only to raise Sierra Leone's growth rate, but also to deepen its effect on real sectors of the economy. More adequate, reliable and affordable power supply will for instance enhance the modernization of agriculture and in turn support the increasing quality of life. Job creation, productive use and business development as well as improved social service delivery for the poor are likely achievements of applying the policy.

1.3 Economic justification of the Renewable Energy Policy

Sierra Leone is blessed with abundant primary energy resources. These include reserves of crude oil and natural gas (volume unknown) and renewable energy resources such as hydro, fuelwood, solar, wind and biomass. However, since independence (1961), the economy has been solely dependent on the importation of petroleum products to meet its development expenditures.

Renewable energy is a clean and green form of energy and could contribute highly to the socio-economic conditions of the country such as reduction on the dollar trade for the

importation of petroleum products, minimizing the effect of greenhouse gas and enhancing healthy contribution to the energy mix structure.

Sierra Leone's formal business sector is relatively small and gradually evolving but the country is rated as one of the world's top ten business reformers, moving from 176/185 countries to 140/185 within 2008 to 2013. The country has witnessed significant private sector inflows as foreign direct investment (FDI) has increased three-fold during the past five (5) years. Nevertheless, the gaps are still huge irrespective of progress made in infrastructure investments between 2009 and 2013.

Currently, fuelwood accounts for over 93% of overall domestic primary energy consumption in the country and is the dominant source of energy in the domestic sector. It is also used in other sectors of the economy, such as cottage industries. Over the years the fuelwood supply/demand imbalance in some parts of the country has adversely affected the economic well-being of the people. At national level, increasing fuelwood consumption contributes to deforestation, with consequences for desertification and soil erosion. This policy is also aimed at developing a robust forest management program in collaboration with the forestry sector for sustainable use of fuelwood energy, in order to reduce the rapid depletion of wood.

Solar energy resource intensity is generally high (1800 kWh/ m²/y) in the country. Solar energy is widely used for drying, most especially for agricultural products. Solar energy as a source of electricity is largely non-existent, except for its use in street lighting, in some homes, in some parks. Therefore, the capture of solar energy for electricity has great potential for the provision of power for rural development (Africa Solar Potential, 2008).

Offshore and onshore wind power plants are a great potential contributor to a more sustainable, ecologically sound energy generation landscape. However, like any other power generation project, wind farms are capital intensive, and require a high degree of precision technology. There is a very good potential to harness energy from wind with

average wind velocity range from 3m/s to 8m/s, especially in coastal areas, offshore, and some inland areas in Sierra Leone with 8m/s. Small wind generators can be used in off-grid electricity generation on farms, in rural areas, and in homes. Such technology is simple and largely affordable according to an experience of a local firm in Sierra Leone.

1.4 Energy security and growth

The driving force for energy security through diversification of supply in Sierra Leone has remained one of the National Energy Policy's key goals, since a major portion of the nation's energy expenditure is via dollar-denominated imported fuels that impose a heavy burden on the economy.

In Sierra Leone, over-dependence on subsidized petroleum products as primary energy sources has slowed down the development of renewable fuels. Diversification to achieve a wider energy supply mix will ensure greater energy security for the nation.

The development of renewable fuels from locally available energy resources should therefore be vigorously pursued. More evenly distributed power generation is an important consideration for the country energy sector, in terms of energy security and geo-political balance.

The rural populaces, whose needs are often basic, depend to a large extent on traditional sources of energy, mainly biomass, used on inefficient appliances. This class of fuels constitutes over 85% of total energy consumption in the country. Fuelwood supply/demand imbalance in some parts of the country is now a real threat to the energy security of the rural communities. Electricity supply in rural areas is largely non-existent, denying access to small and medium enterprises (SMEs) and such things as lighting and refrigeration for almost 75% of the nation.

Some activities in this regard have already been initiated by Government as part of its Integrated Electrification Plan. It developed a scheme for providing hydropower

electricity generation and solar photovoltaic street lights and solar lanterns to district head quarter towns that are expected to replace candles, illuminating paraffin and battery charging. Hence, special attention needs to be paid to the diversification of the energy supply mix in the rural areas.

It is clear that renewable energy development will require financial incentives. While the Government intends to provide the necessary incentives, Sierra Leone's fiscal resources are limited, and there are competing high priority social and economic programs. Hence, the financial resources for these incentives will have to come from a combination of Sierra Leone and international sources. Sierra Leone ratified the United Nations Framework Convention on Climate Change (UNFCCC) on the 22nd of April, 1995 and the Kyoto Protocol in June, 2005, which create the framework for tapping international funds *via* the Global Environment Facility and the Clean Development Mechanism to reduce greenhouse gas emissions.

1.5 Purpose of the policy

The purpose of this Policy document is to set out Government principles, objectives and strategies for renewable energy. It furthermore commits Government to many enabling actions, to ensure that renewable energy becomes a significant part of its energy portfolio over the next fifteen years.

Government intends to strategically develop the renewable energy resources in the future in a systematic way. The policy challenge for the Government will be to provide sufficient incentive for the renewable energy sector to develop, grow and to be sustainable in the long term.

Sierra Leone's fiscal resources are, however, limited. Nevertheless, the limited financial resources available should be accessible for renewable energy programs that will be optimally used with a specific emphasis on ensuring that the global climate change

resources, involvement of public private partnership and other financial resources are accessed to facilitate its implementation.

The very nature of the above challenges suggests the need for policy directives, rules, regulations and standards that will provide detailed implementation frameworks, which are required to spur the deployment of renewable energy, with the resulting energy market performance. The benefits include greater access to electricity, especially amongst rural people for which connecting them to the grid is an expensive proposition.

This policy, therefore, 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. In this policy document, action plans are recommended for all relevant agencies for the adoption of specific policy targets such as Feed-in Tariff (FiT).

It is expected that a Committee, under the Chairmanship of the Minister of Energy, will review this document at least once every three years. The results of such review will be used to update or replace this policy or its existing replacement subject to approval by the Strategy and Policy Unit (SPU). In view of significant changes in the orientation of the Sierra Leone Energy Sector, especially regarding public-private partnerships sector participation, it will also be necessary to involve the representative of the private sector and our development partners, prior to SPU approval of any future review.

2.0 EXISTING SITUATION OF RENEWABLE ENERGY IN SIERRA LEONE

Sierra Leone's energy demand is characterized by a low per-capita consumption of petroleum and electricity energy and a high dependence on renewable energy including biomass fuels in the form of firewood, charcoal and bio-waste. Biomass will remain the

main energy source for the foreseeable future. However, apart from biomass, there are other potential renewable energy sources available for exploitation. These include small-hydro, solar, and wind. However, there are several challenges in the way of harnessing these resources in a productive and meaningful way.

2.1 Hydropower

In Sierra Leone, hydropower is a major energy source, holding great promise for a country which possesses several rivers that could be exploited for electricity. According to the Power Sector Master Plan (1996), 27 potential hydropower sites with a total capacity of 1,513 MW have been identified. A study conducted by UNIDO (Hydropower Potentials in Sierra Leone, UNIDO, 2013) estimated hydropower potentials to about 5,000 MW covering 300 sites nationwide. However, except for two sites (Bekongor and Bumbuna), most of the others suffer from water flow rate variations between the wet and dry seasons. Yiben II, Bekongor III, Kambatibo, Betmai III, Yiben I and Bumbuna Falls are the most attractive in terms of generation cost. Furthermore, most of these hydropower sources remain virtually untapped.

To date, Sierra Leone has built three hydroelectric plants. These are the 2.4 MW Guma plant installed in 1967 in the Western Area, which was decommissioned in 1982, and a 6 MW run-of-the river hydro power plant, Dodo, located in the Eastern Province, some 380 km from Freetown and 69 km from the headquarter town of Kenema. This plant, operated by the BKPS, is functional, and is a part of a regional grid connecting thermal power plants in Bo and Kenema. The Bumbuna hydropower plant was commissioned in 2009 with an installed capacity of 50MW, 161kv transmission line and 250km line length between Bumbuna and Freetown. It is presently dispatching 25MW due to limitation of the distribution network in Freetown.

Although many of the rivers investigated fall under the small to medium hydro system (i.e. 1 - 100 MW) there is a potential for pico to mini-hydro systems (5 kW to 1MW).

Resources under 2 MW are expected to offer huge potential for public-private partnerships and wider investment by the private sector.

There exists a well advanced construction of a small hydro power plant (2.0 MW) in Port Loko (Bankasoka). It is a project funded by the Chinese Government, UNIDO and GOSL. The government of Sierra Leone and the Chinese government are developing the Charlotte (2.2MW) and Makalie (0.5MW).

In Sierra Leone, hydropower generation has accounted for a substantial part of the total electricity generation mix. Currently, hydroelectricity represents 59% (i.e. hydropower 56 MW; Total grid power 95 MW) of the installed grid-connected electricity generation capacity.

2.2 Bioenergy

Biomass is the main source of energy in use in households in Sierra Leone, mainly in the form of fuelwood and charcoal, while the use of agricultural crop residues and bagasse in the sugar industry remains limited. In addition, there is considerable potential (without impacting on food production) to produce bio-fuels from energy crops such as maize and cassava, and processing of charcoal into biochar.

Biomass for electricity generation would come from such residues, existing forests and deforested or otherwise degraded lands on which “energy plantations” can be cultivated. Of the residues, 656,400 tonnes of crop wastes (rice husk, rice straw, cocoa husk, etc.) are on average produced annually, with a total annual energy potential of about 2,706 GWh, or about 500 MW of potential capacity (Swaray S.M. and Keili A, August 2004). It should be noted that the amount of residue is expected to increase as the Agricultural sector grows. The Addax ethanol project using sugar cane in Makeni has been completed and with available power of 15 MW for supply to the main Bumbuna – Freetown grid.

Dried plant biomass can be used as fuel in thermal power plants or converted to produce solid briquettes, which can then be utilized as fuel for small-scale industries. Biogas digesters of various designs are capable of sustaining household, industrial and institutional energy needs.

Over 93% of Sierra Leone's population depends on fuelwood for cooking and other domestic uses. The consumption of fuelwood is worsened by the widespread use of inefficient cooking methods, the most common of which is still an open fire. The rate of consumption of fuelwood far exceeds the replenishing rate to such an extent that desert encroachment, soil erosion and loss of soil fertility are now serious problems in the country.

The largest sources of fuelwood at present are from open forests, communal woodlots and private farmlands. Supply from natural forest regeneration is continuously being diminished due to the additional activities such as the clearing of forests for development projects, agricultural production and industrial activities. Forests are essential for a healthy environment; mitigate on desertification, wind and water erosion, and serve as energy sources.

Wood fuel is the dominant and cheapest fuel available on the Sierra Leonean market; the production, transportation and sale of wood fuels are all undertaken by the private sector. There is no official government pricing regulatory body responsible for setting the prices of wood fuels in Sierra Leone; rather the pricing is dependent on the supply and demand conditions.

The potential exists to utilize the manure and litter from livestock to generate methane gas through anaerobic fermentation in biogas plants.

Heat and electricity generation in the form of co-generation of electricity in the industrial sector from biomass using the bagasse energy should be re-introduced in the Port Loko district at the former Magbass sugar cane industry in the country.

In the country charcoal is used extensively as a domestic fuel. It is also used mainly in the recreation, catering and metallurgical industry.

Biofuels: Various crops can be fermented to produce ethanol (ethanol gel fuel) and sunflower seeds and Jatropha tree nuts crushed and processed to yield bio-diesel. Sierra Leone is dependent on importing petroleum products for its liquid fuels requirements. Considerable scope therefore exists to supplement imported petroleum with bio-fuels.

The major environmental problem related to renewable energy production from biomass, if not properly managed, is mainly deforestation. From the Ministry of Agriculture, Forestry and Food Security, indicated that between 1990 and 2010 the nation lost around 392,000 hectares, 12.6% of its forest cover. The nation's 2.726 million hectares of forest and woodland reserves could be depleted within the next hundred and thirty-six years, if not properly managed. These would result in negative impacts on the environment, such as soil erosion, desertification, loss of biodiversity, microclimatic change and flooding. Most of these impacts are already evident in different ecological zones in the country, amounting to huge economic losses.

Sierra Leone puts almost of its refuse to landfill sites. The energy content of the total domestic and industrial refuse disposed of in 2012 amounted to 594,000 tons per annum. The most feasible area for incineration of refuse, from large municipalities, would be the Kingtom dump and Freetown/Waterloo Highway dump sites. It is estimated in 2012 that approximately 268,000 tons could be produced annually. The net realizable energy available from sewage-derived methane in Sierra Leone would be assessed for electricity generation and for heating purposes. Options for energy production from municipal waste should be examined including biogas projects as well as methane gas from landfills.

2.3 Solar energy

Sierra Leone experiences sunshine for most part of the year and hence solar energy is in abundance. A study estimated the average solar radiation at 1460 to 1800 kWh/ (m²/y) (solar potential mapping, 2008), which indicates the huge potential for solar power in the country.

The potential for Solar PV or solar home systems is great in the country due to the solar radiation and very low access of electricity in the country. Solar street lighting has been installed in all the 14 districts of the country and some of our development partners have installed solar PV's in schools, hospitals, district councils and growth centres.

The use of solar PV is increasing in the country. A few solar home systems are used for lighting and entertainment; some institutions are using it for water pumping and water heating.

The current installed capacity of solar PV in the country is about 2.5 MWp in 2014.

The potential uses and applications of solar energy in Sierra Leone include:

- Solar passive building design practice for residential, commercial and industrial buildings to minimize thermal energy consumed. This includes the energy that is consumed by end-users, as well as that which is embedded in the construction of the building.
- Solar water heating for domestic, recreational, institutional and industrial use.
- Solar space heating - closely related to solar passive and active building design practice and can also include solar water heating technologies.
- Solar cookers as an alternative to cooking with fuelwood in the rural areas.
- Agricultural use (e.g. crop drying, greenhouses), especially for small-scale farming and solar panels for irrigation (water pumping) purposes.

- For electricity (photovoltaic and solar thermal) generation, ranging from small to medium scale stand-alone applications to large-scale grid-connected applications.
- Heat pumps for water heating.

2.4 Wind energy

Sierra Leone's best wind velocities indicate a country-wide average of between 3 m/s and 5 m/s, increasing to approximately 8 m/s in some mountainous areas (Metrological Statistics, 2012). There is some indication that wind speeds of 12 m/s are possible in parts of the country, implying that wind energy could be a viable option in selected locations. Wind farms are for instance possible at certain locations such as along the coast line, at sea near the coast line and at some locations in the country.

With the low wind speed turbines now available in the market, there is a strong potential for the use of these systems in the rural areas especially in the north of the country. There is a known wind energy system of 5kw in Sierra Leone, located in the Bonthé District, along the south coastline area.

3.0 CHALLENGES FOR RENEWABLE ENERGY POLICY

The challenges for renewable energy deployment in Sierra Leone are outlined below:

- Ignorance and low level of awareness
- Non-affordability
- Lack of financing and private investment
- Absence of adequate research and development
- Lack of economic incentives

- Lack of human capacity
- Lack of legal framework and enforcement mechanisms
- Lack of accurate data

4.0 VISION

An energy economy in which renewable energy increases its share in the energy mix, is reliable and affordable throughout Sierra Leone, thus contributing to sustainable development and environmental conservation.

5.0 GUIDING PRINCIPLES FOR RENEWABLE ENERGY

5.1 Overview

The Sierra Leone policy document considers the broad nature of energy and therefore addresses diverse issues such as renewable energy supply and demand; renewable energy financing and pricing; legislation, regulation and standards; renewable energy project implementation issues; research and development; capacity building and education; gender, children and environmental issues; planning and policy implementation. Strategic goals and supporting objectives are part of the enabling framework which supports Government purpose in meeting its commitment to promoting renewable energy. Achieving this requires four key strategic areas such as: financial instruments, legal instruments, technology development and awareness-raising, capacity building and education. In addition to the objectives and policies, associated strategic measures have been identified.

5.2 Enabling business environment

The Government of Sierra Leone is to create an enabling environment through the introduction of fiscal and financial support mechanisms within an appropriate legal and regulatory framework to allow renewable energy technologies to compete with fossil-based technologies. There is a need for Government support for renewable energy intervention on a wider scale to help establish initial market share and demonstrate the viability of renewable sources, in order to achieve economies of scale and technological development. Mechanisms need to be developed to overcome the barrier of non-discriminatory third party access to the Grid and procedures and wheeling charges defined and regulated to remove the barrier of cost effective tariff.

5.3 Policy objectives

The policy objectives and implementation strategies have been carefully defined, with the fundamental guiding premises being that energy is crucial to national development goals and that government has a prime role in meeting the energy challenges facing the nation. Therefore, this renewable energy policy is designed to pave the way for detailed legislation, policies and regulations. Consequently, the overall renewable energy **policy objectives** may be summarized as follows:

- i. Ensure the development of the nation's energy resources, with diversified energy resources options, for national energy security and optimal energy resource mix.
- ii. Guarantee adequate, reliable, affordable, equitable and sustainable supply of renewable energy, cost-reflective and in an environmentally friendly manner. To establish the process of acquisition and diffusion of technology, managerial expertise and indigenous participation in the renewable energy sector industry, for stability and self-reliance.

- iii. Promote investments and development of the renewable energy sector, with substantial public-private partnerships (PPPs) participation.
- iv. Ensure a comprehensive, integrated and well-informed renewable energy, with plans and programs for effective development.
- v. Foster international cooperation in trade and project development, in the ECOWAS, African Region and the World at large.
- vi. Use successfully the nation's abundant energy resources to promote international cooperation.
- vii. Bring abundant electricity access to population.
- viii. Develop the nation's renewable energy resources through the establishment of appropriate financing mechanisms that support private investment in the subsector.
- ix. Ensure effective coordination and collaboration among all players in renewable energy activities in Sierra Leone.

5.4 Financing

Financing is crucial to realizing the Government's policy thrust on renewable electricity. Funding requirements will be substantial. New investments are needed for research and exploitation activities. The required type of financing is long-term and involves both foreign and domestic financing resources. However, foreign investment capital will provide the greater proportion of needed funds. The Government will provide guarantees and financial frameworks aimed at stimulating the expansion of the renewable electricity market. Considering the risk element involved in financing renewable energy projects, government investments should enhance rates of return and shorten pay back periods in order to attract investors. Additionally, the Government shall continuously improve the climate for enhanced funding of renewable electricity through equity, debt financing, grants and micro finance.

5.4.1 Objectives

- i. Ensure that an equitable level of national resources are invested in renewable energy technologies.
- ii. Set targets for directing public resources for the implementation of renewable energy technologies in combination with international sources of funding for this purpose.
- iii. Establish a **Central Energy Fund** through GoSL consolidated funds in financing the implementation of renewable energy initiatives.
- iv. Introduce appropriate fiscal incentives for renewable energy.
- v. Facilitate local and international donor intervention in the provision of grants, interest-free loans as well as other fiscal incentives for the acquisition of renewable energy devices including solar photovoltaic and thermal, wind and biomass systems.
- vi. Encourage utilization of efficient renewable energy technologies by providing tax-free concessions on the technologies themselves and proven energy-efficient devices.
- vii. Extend existing state financial support systems and institutions and introduce innovative approaches to the establishment of sustainable structures and financing mechanisms for delivering renewable energy systems.
- viii. Facilitate the creation of an investment climate for the development of the renewable energy sector that will attract foreign and local investors.
- ix. Phase out gradually fossil fuel subsidies
- x. Ensure the availability of adequate funding for the renewable energy sub-sector.
- xi. Ensure continuity in the funding of projects in the renewable energy sub-sector.
- xii. Attract foreign investments from a highly competitive international finance market.
- xiii. Ensure that renewable energy supply options adopted are the most cost-effective for the country.
- xiv. Encourage the local development of renewable energy technology with a view to minimizing the cost input of renewable energy projects in line with regional/ECOWAS policy and target.

- xv. Encourage local government and community investment in renewable energy projects.

5.4.2 Policy statements

GOSL will promote the implementation of sustainable renewable energy through the establishment of appropriate financial and fiscal instruments including public-private partnerships (PPPs) schemes.

GOSL will remove barriers hampering the effective development, implementation and dissemination of RETs.

GOSL will facilitate local development agency initiatives for renewable energy with tax-free incentives for the acquisition of renewable energy devices.

5.4.3 Measures

- i. An analysis of the current financial framework and an identification of barriers to the implementation of renewable energy sources.
- ii. An investigation into appropriate financial (e.g., subsidies, and green certificates) and fiscal instruments/incentives (e.g. low interest loans and tax rebates) to stimulate the implementation of renewable energy technologies and practices.
- iii. Clarifying the role of the **Central Energy Fund** in financing the implementation of renewable energy initiatives. The Fund could be used for example to facilitate access to green financing, as well as acting as a loan guarantor to reduce the risks for financing institutions.
- iv. Monitoring and evaluating the effectiveness of financial incentive schemes.
- v. An equitable electricity tariff structure that will be managed by the National Electricity & Water Regulation Commission that addresses the issue of cost of supply for the different renewable energy technologies, including capital replacement costs for non-domestic users.

- vi. Supporting a national “green” market survey to ascertain the willingness of customers (households and commerce) to pay a premium for “green” energy.
- vii. Dedicating a certain percentage of the nation's revenues from conventional energy sub-sector to support training, research, development and demonstration, technical standards and technology acquisition in the renewable energy sub-sector.
- viii. Establishing framework for the use of Sovereign Guarantees to support appropriate renewable energy projects.
- ix. Providing fiscal incentives, subsidies to alleviate up-front costs, tax and duty exemptions for prospective investors in the renewable energy sub-sector.
- x. Ensuring a reasonable return on investments through cost-effective renewable energy pricing.
- xi. Establishing guarantees for investments in renewable energy projects.
- xii. Encouraging renewable energy firms to source development funds from the Sierra Leonean capital market.
- xiii. Expanding the scope of venture capital financing to embrace investments in the renewable energy sector.
- xiv. Improving the overall macro-economic and financial framework that ensures the availability and affordability of long-term funding for investors in renewable electricity.
- xv. Mainstreaming renewable energy in the country’s agenda. Providing grants to local governments and communities to support renewable energy planning and implementation projects.

5.5 Legal instruments

5.5.1 Objectives

- i. Develop a new Renewable Energy Act.

- ii. Develop an appropriate legal and regulatory framework for pricing and tariff structures like feed-in-tariff to support the integration of renewable energy into the energy economy and to attract investment.
- iii. Develop an enabling legislative and regulatory framework to integrate Independent Power Producers into the existing electricity system.
- iv. Develop an enabling legislative framework to integrate local producers of liquid fuels and gas from renewable resources into their respective systems.

5.5.2 Policy statements

GOSL will develop legislation to continuously improve an effective and appropriate legislative system to promote the development and implementation of renewable energy.

GOSL will introduce mandatory support instruments for electricity from renewables.

5.5.3 Measures

- i. Appropriate regulations for grid-connection and wheeling of electricity generated from renewable energy.
- ii. Establishing Feed-in-Tariffs (FiT) which typically incentivize electricity producers by offering more favorable pricing for electricity produced through renewable energy
- iii. Introducing Power Production Tax Credit (PTC) to electricity generation companies which is aimed at incentivizing the adoption of renewable energy
- iv. Adopting a Public Benefits Fund (PBF) which requires that a certain percentage of the tariff is dedicated to supporting renewable energy generation projects on and off the grid.
- v. Phasing in of regulations requiring power generator tariffs to be based on full cost accounting and the incorporation of environmental externalities.

- vi. New legislation for the energy sector incorporating renewable energy that provides equitable opportunities for their development.
- vii. Regulations for the petroleum industry to accommodate locally produced biodiesel and ethanol in fuel blending.
- viii. Appropriating legal and regulatory instruments to stimulate the uptake of renewable energy power generation into the electricity system.
- ix. Mechanisms to increase the access of renewable energy to the national electricity grid.

5.6 Technology development

5.6.1 Objectives

- i. Promote the development and implementation of appropriate standards and guidelines and codes of practice for the appropriate use of renewable energy technologies.
- ii. Promote appropriate research, development and local manufacturing to strengthen renewable energy technologies, devices and optimize their implementation.
- iii. Encourage and support private sector participation in the promotion and development of Renewable Energy fuels, devices and technologies at competitive prices.

5.6.2 Policy statements

**GOSL will promote, enhance and develop technologies using hydro, solar, bioenergy and wind for the implementation of sustainable renewable energy.
GOSL will facilitate the growth of the Renewable Energy Industry.**

5.6.3 Measures

- i. Standards governing the design, installation and performance of renewable energy systems, together with a certification process to verify that systems meet these standards.
- ii. Reviewing Government tender procedures to include standards for renewable energy technologies.
- iii. Monitoring ongoing research and development programs and identify additional investigations and demonstration projects that would assist in the development and optimization of renewable energy systems.
- iv. Identifying the appropriate public/private partnerships for the promotion of renewable energy technology development and implementation.
- v. Identifying and expanding areas for international cooperation in the field of renewable energy.
- vi. Identification and enhancement of appropriate mechanisms to gain from technology and skills transfer and to benefit from international experience.
- vii. Establishment of structured experience exchange and sharing of information on best available technologies and appropriateness under local conditions.
- viii. Cost-effective energy storage mechanisms investigated.
- ix. Establishing and integrating renewable energy R&D to a new National Energy Research Institute

5.7 Awareness-raising

5.7.1 Objectives

- i. Promote knowledge of renewable energy and thereby increase its use.
- ii. Promote and stimulate the renewable energy market through the dissemination of information regarding the economic, environmental, social and trade benefits of renewable energy technologies and their applications.

- iii. Persuade the appropriate Government and Government-funded institutions to implement training and education programs with regard to renewable energy.
- iv. Involve actively women in decision-making and planning and promote empowerment in renewable energy programs or activities.
- v. Improve communication and interaction between national, provincial and local Government institutions on renewable energy policies.

5.7.2 Policy statement

GOSL will raise public and stakeholder awareness of the benefits and opportunities of renewable energy.

5.7.3 Measures

- i. Awareness of the economic and environmental benefits of using Renewable Energy (RE) technologies through public education (television, radio and other media).
- ii. Development of solar water heaters in institutional facilities, hotels and private households.
- iii. Development of standards for accrediting renewable energy training programs.
- iv. Training programs on renewable energy for stakeholders.
- v. Awareness-raising and marketing campaigns aimed at all stakeholders.
- vi. Establishment of a renewable energy information centre or network of centres.
- vii. Development of Renewable Energy in Technical and Tertiary Curricula.
- viii. Development of Renewable Energy Training Institutes and Centres of Excellence.
- ix. Development of Renewable Energy Research and Development Action Plan – reduce cost of technology and promote wider application.
- x. Coordination and cooperation in technology, and economic research between Government and private sector.
- xi. Strong linkages between local and international research institutes.

- xii. Development of Renewable Energy innovations.
- xiii. Good relationship with media, Non-Governmental Organizations (NGOs) & private entities.
- xiv. Demonstration and awareness programs in primary and secondary schools.
- xv. Periodic monitoring and evaluation of RE activities.

5.8 Capacity building and education

5.8.1 Objective

Establish training programs for the development of specialized energy manpower.

5.8.2 Policy statement

GOSL will support training in RETs in tertiary and other learning institutions.

5.8.3 Measures

- i. Developing and promoting local capability in the nation's Renewable Energy Centres and Research Institutes for the design and fabrication of energy efficient devices and technologies for the utilization of renewable energy resources.
- ii. Capacity-building measures for authorities to conduct technical and economic evaluation of RES projects, awareness raising about innovative technologies and business models.
- iii. Capacity-building for staff from financial institutions in assessing loan applications and administering loans in renewable energy projects.
- iv. Capacity-building of policy makers and practitioners to integrate gender in their cooking energy policies and programs.

- v. Initiating and promoting renewable energy and energy efficiency educational programs in tertiary institutions and research institutes.
- vi. Training of industry staff in RE measures and RE project financing
- vii. Integration of renewable energy and energy efficiency subjects in school and university curricula.
- viii. Strengthening capacity of state agencies for planning and implementation of mini-grids based on renewable energy sources.
- ix. Public-private mechanisms developed for mini-grids based on renewable energy sources.
- x. Training of local agencies to ensure operation and maintenance of mini-grids based on renewable energy sources.
- xi. Sensitizing local communities at district and village levels on the benefits of mini-grids projects based on renewable energy sources.
- xii. Strengthening capacity of private service providers to maintain mini-grids equipment.
- xiii. Launching public awareness campaigns to sensitize different stakeholders to the main issues related to renewable energy planning, and offer training programs in renewable energy to interested civil society organizations.

5.9 Environmental concerns

5.9.1 Objective

Include environmental considerations in all energy planning and implementation processes and thereby reduce adverse environmental impacts of the energy sector

5.9.2 Policy statements

GOSL will ensure that environmental considerations are included in all renewable energy planning and implementation and will enhance cooperation with other relevant stakeholders.

GOSL will develop solar batteries disposal mechanisms and ensure strict adherence to implementing agencies.

5.10 On-grid renewable energy supply

Large renewable energy projects are to be transmitted via the grid. In addition to supporting the construction and completion of major hydro power projects, this policy is expected to further stimulate the development of large-scale renewable energy projects.

5.10.1 Objective

Increase the share of renewable energy sources in a reliable and sustainable energy supply system.

5.11 Off-grid renewable energy supply

It is estimated that more than 95% of Sierra Leoneans who live in rural areas are currently not connected to the national electricity power grid. This policy seeks to drive the framework for supply of productive electric power to 60% of remote off-grid communities in a sustainable and commercially viable manner in the country.

Off-grid renewable electricity projects are vital to meeting the Government's targets in the electric power sector and expanding access, especially to rural areas. It is expected that this policy will enable the development of a framework to leverage on the capabilities of the private sector, for technical appraisal, engineering design, project

management and delivery of renewable energy projects. Consequently, the framework to be developed and deployed will also consider the utilization of possible public-private partnership project models for the deployment of renewable energy projects.

5.11.1 Objectives

- i. Ensure the provision of electricity to all remote and off-grid areas of Sierra Leone as well as increasing grid supplied electricity in line with the regional/ECOWAS policy and target.
- ii. Provide reliable and stable power supply to consumers, especially to industries in remote and off-grid areas for productive use.
- iii. Ensure the removal of bottlenecks to the development of off-grid electricity in Sierra Leone.
- iv. Attract investment capital, both foreign and domestic, for the development of renewable energy for both on and off-grid projects.
- v. Maximize access of Sierra Leoneans to the investment opportunities in the electricity industry, created by the power sector reforms.

5.11.2 Measures

- i. Commencing feasibility studies using renewable power generation for remote/off-grid areas.
- ii. Commencing feasibility studies for a major hydro, a large-scale wind, offshore wind, wave energy, Concentrated Solar Power (CSP) plant and other renewable energy sources
- iii. Commencing feasibility studies for small community renewable energy solutions for off-grid areas, including wind and solar, mini, micro and pico-hydro, and bioenergy.
- iv. Supporting the establishment of basic engineering infrastructure for the local manufacture of solar energy equipment, devices and materials.

- v. Developing and implementing a program for the participation of the private sector in the remote and off-grid sectors of the electricity industry.
- vi. Intensifying the national effort in training, research and development with a view to generating electricity using solar, wind, biomass and other renewable resources in order to conserve our fossil fuels.
- vii. Providing appropriate incentives to entrepreneurs to ensure adequate returns on investment in power generation from renewable energy sources.
- viii. Providing appropriate financing facilities to support indigenous investments in renewable energy power generation for remote and off-grid sectors areas.
- ix. Encouraging off-grid generation and supply of power in remote areas.
- x. Conducting zoning and resource assessment to identify renewable power development zones in areas of high resource potential and routes for electricity transmission.

5.12 Feed-in tariffs

5.12.1 Objective

Ensure a stable and attractive pricing policy for renewable energy sources.

5.12.2 Measures

The Electricity and Water Regulatory Commission (EWRC) will introduce and develop optimal feed-in tariffs (FiT) for small hydro schemes not exceeding 10MW, and all biomass cogeneration power plants, solar and wind-based power plants, irrespective of their sizes. It is expected that specific tariff regimes formulated by EWRC shall be long term, guarantee buyers under standard contract and provide a reasonable rate of return. EWRC will also develop other tariff-related incentives and regulations to support renewable energy adoption.

Subject to the provisions of this Policy Guideline, EWRC shall specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the promotion of renewable sources in electricity production.

5.13 Institutional support and coordination

5.13.1 Objective

Acknowledge energy planning, including renewable energy planning, as an integral part of national development planning and ensure an effective coordination of all energy sub-sectors and institutions.

5.13.2 Measures

Energy development decisions are not taken as isolated sectoral plans, but rather, closely linked and reconciled with those of the rest of the economy. In this regard, the Ministry of Finance and Economic Development and Ministry of Energy should focus some attention to and support the country's energy diversification goals promoted in this policy.

The Ministry of Energy as the governmental organ for the policy-making activities within the electricity industry will help ensure the coordination and implementation of a comprehensive and integrated renewable energy policy. This will require, as a planning tool, an integrated Energy/Electricity Resource plan (IRP), considering the Benefits/Cost ratio of each renewable energy source. This development must however be complemented by promoting cooperation between the Ministry of Energy and relevant MDAs, such as: Ministry of Water Resources; Ministry of Agriculture, Forestry and Food Security; Ministry of Lands, Country planning and Environment; Ministry of Education, Science and Technology; Ministry of Trade and Industry etc.

This policy would provide necessary links through consultative platforms between state and local Government for the execution of some of the programs at both State and local Government levels.

The successful implementation of the renewable energy policy will require the active participation of Development Partners, Non-Governmental Organizations, Civil Society and Women groups. Therefore, the inputs of these stakeholders are essential in the formulation of policy framework and implementation of strategies. This will be particularly valuable in helping rural communities implement renewable energy programs.

Private investment funds required by the renewable energy sub-sector will be for instance foreign and local capital, private public partnership, environmental/green finance options (i.e. emission trading) or financing mechanisms, etc. Thus, the environment must be made conducive to attract such investments and funding opportunities. It will be necessary to encourage and promote foreign as well as indigenous private sector participation in the sub-sector. Optimized use of available and raised financial resources will be pursued.

5.13.3 Ministry of Energy

Division of Energy (DoE) was established by an act in 2010 under the Ministry of Energy. The DoE was set up to conduct strategic planning on energy security and access issues and was mandated to introduce new energy resources and ensure efficient utilization of energy resources. To further implement its objective, the DoE formed the Renewable Energy, Energy Efficiency and Rural Energy units in 2012 to address the issues of renewable energy and energy efficiency. The unit is charged with the responsibility of organizing and conducting research and development in renewable energy and energy efficiency and conservation. It is also expected to train public, private, stakeholders and students in areas around RE and EE.

5.13.4 Electricity and Water Regulatory Commission

The newly established National Electricity and Water Regulatory Commission and other key stakeholders will ensure an enabling environment to create space for renewable energy activities in the country. However, the appropriate regulatory and legal framework will be needed to support the entry of renewable energy generators. The national electricity and water regulator has jurisdiction over the entire industry and should regulate market access through licensing of all producers, transmitters, distributors and sellers of electricity, and should regulate the phased introduction of renewable energy generators. A **Central Energy Fund** should be established to assist the implementation of renewable energy and other forms of energy through the extension of its operational support.

5.13.5 Electricity sector

Quite recently the single electricity producer, National Power Authority (NPA) is currently being unbundled and undergoing restructuring into two electricity entities, namely, Electricity Distribution and Supply Authority and Electricity Generation and Transmission Company by the National Electricity Act 2011. The Act 2008 encourages the entry of multiple players into the generation market.

5.13.6 Petroleum sector

An Act should provide a basis for the integration of renewable energy derived liquid fuels such as bio-diesel and ethanol and landfill gas into the petroleum industry regulatory framework, to create an enabling environment for fair competition.

5.13.7 Ministry of Agriculture, Forestry and Food Security, Forestry Division (FD)

Ministry of Agriculture, Forestry and Food Security, Forestry continues to play a leading role in the fuelwood sector both in terms of policy formulation and regulation. It holds a key role in matters related to bioenergy and crop-related energy issues. It is responsible to promote micro-nursery and community forestry through tree replanting and farmers-managed Agroforestry to ensure that there is sustainable supply of renewable biomass that will alleviate the pressure on natural forests.

5.13.8 Environmental Protection Agency (EPA)

EPA is responsible for ensuring that environmental impact assessment measures are adhered to for energy related programs. The EPA works closely with MoE in the designing of GEF-funded projects and works to enhance their capacity in the coordination and networking of clean technology and to develop a baseline data inventory monitoring system.

5.13.9 ECOWAS Renewable Energy and Energy Efficiency Center (ECREEE), Cape Verde

ECREEE as ECOWAS' Center of Excellence is established to enhance regulatory, financial and technical capacity of the Ministry of Energy in formulating RE and EE policy, action plans and SE4ALL action agenda. WACCA through ECREEE is also supporting the MoE in the development and harmonization of standards and labels for cook stoves and testing.

5.13.10 Proposed Renewable Energy Technology Centers

It is necessary to consider which technologies can be promoted by measures to stimulate the market. In the short-term it is important that technologies that are currently available in Sierra Leone are implemented. The local content of equipment needs to be maximized, to minimize the costs associated with implementation and operation, as well as the promotion of employment opportunities. The establishment of technology support centers within existing research and development institutions will

facilitate the promotion and ongoing development of technologies and will assist Government in the certification of systems.

5.14 Governance

5.14.1 Objective

To establish an appropriate and effective governance framework for renewable energy policy development and implementation.

The Ministry of Energy will take overall responsibility for renewable energy policy in Sierra Leone and will establish the appropriate enabling environment to ensure that activities undertaken by other stakeholders are coordinated and effective.

A future Energy Regulator will be established to regulate market access through licensing of all producers, transmitters, distributors and sellers of energy. However, the recently formed Electricity and Water Regulation Commission (EWRC) will regulate the prices at which power is purchased from all generators, including EDSA, EGTC and the Independent Power Producers, handle customers' complaints and approve electricity tariff and feed-in-tariff.

The key focus area of **the proposed Central Energy Fund (CEF)** is aimed at contributing to the development of Sierra Leone's energy sector by facilitating the universal access to energy, including the increased use of renewable energy. The CEF will render operational support to the energy sector in the form of government treasury support. Mechanisms will be investigated to extend the operational support available from the Central Energy Fund to renewable energy programs. The Ministry of Energy

will develop a partnership approach to ensure an integrated focus for national renewable energy initiatives.

5.15 Research and development

The establishment of renewable energy technology support institutions/centers within existing research and development institutes and a **proposed National Energy Research Institute** would facilitate the promotion and ongoing development of technologies and would assist Government in the certification and approval of systems. One essential element in sustainable renewable energy generation will be technological development aimed at reducing costs and increasing efficiency.

5.15.1 Objectives

- i. Initiate and promote renewable energy and energy efficiency related research and development programs, and ensure that such programs are applications-oriented and market-driven.
- ii. Promote participation in research and development by Sierra Leoneans in all areas of energy exploration, development and utilization.

5.15.2 Policy statement

GOSL will support research and development work in renewable energy matters, as well as linkages with countries active in RET research and development.

5.15.3 Measures

- i. Promoting the demonstration and dissemination of renewable energy and energy efficient devices and technologies for their adoption and market penetration.
- ii. Initiating and sustaining local capability for RES/EE applications in all sectors of the economy.
- iii. Initiating and promoting renewable energy and energy efficiency research activities in tertiary institutions and research institutes.
- iv. Encouraging result-oriented research and development, including information systems and software solutions, for the renewable energy and energy efficiency sector, by making expenditure on such efforts tax deductible.
- v. Encouraging data collection and statistical analysis of energy consumption patterns and penetration of different energy conversion and use technologies in different sectors as well as adequate renewable energy resource assessments.

5.16 Gender, children and energy

5.16.1 Objectives

- i. Include gender and children aspects in all policy, program and project planning, implementation, monitoring and evaluation processes.
- ii. Develop policies and strategies to ensure women's economic and social empowerment.
- iii. Build capacity of women to work in the energy sector.

Conventional energy approaches virtually exclude women's concerns. Consequently, economic growth has been accompanied by severe gender disparities. In Sierra Leone 45% of rural households are female-headed. These households typically cook daily with fuelwood and crop residues while urban women use untreated charcoal. Since

entrepreneurial home-based industries depend on biomass supplies, women spend long hours working in survival activities – cooking, fuelwood collection, water carrying and food processing.

Providing access to alternative fuels or to efficient stoves would improve this situation as well as mitigate the indoor air pollution associated with the use of fuelwood.

Sustainable energy development could have a positive impact for women. But this can only be realized when women’s concerns are properly reflected in energy policy-making.

This will lead to:

- i. Recognition of women’s non-market labor time as human energy and to the relief of this burden as an objective of energy policy,
- ii. Involvement of women in policy formulation and planning for fuels and appliances,
- iii. Bridging the gap between designer and end-user regarding energy efficiency improvements in stoves and other appliances,
- iv. Availability of more information on alternative sources and technologies,
- v. Recognition of energy needs in transportation, food harvesting, drying and processing,
- vi. Diversifying fuels to substitute fuelwood by more efficient and cleaner technologies,
- vii. Involvement in decision-making regarding energy matters at energy forums,
- viii. Assisting women to develop entrepreneurial skills through productive uses of renewable energy technologies.
- ix. Among the energy sector, stakeholders’ women are poorly represented and this calls for training and skill development for women.
- x. Career guidance should be offered at schools to encourage more young women and men to acquire appropriate skills.
- xi. Provision of street lighting for safety.

- xii. Provision of power at health centers and clinics, where birthing most safely takes place, as well as recognizing the electricity requirements around both birthing and neo-natal care of babies.

5.17 Indigenous participation

If private sector participation in the renewable energy sub-sector is increased and government spending in the sector is optimized, the ability of the indigenous private sector, including ordinary Sierra Leonean citizens, to participate and compete in the process should be encouraged, to allow for a secure and healthy development of the renewable energy sub-sector. It is expected that the local content of value added in the renewable energy sub-sector activities shall be raised to, and maintained at, a high level. Government support in the promotion of joint ventures between local and foreign firms may have value in this respect.

5.17.1 Objectives

- i. Ensure effective participation of the indigenous private sector in the renewable energy industry value chain as indicated in the regional policy.
- ii. Ensure broad-based participation of Sierra Leoneans in the investment opportunities in the renewable energy sub-sector.
- iii. Achieve a high level of local content in the renewable energy sub-sector activities.

5.17.2 Policy statement

GOSL will encourage and support public-private partnerships (PPPs) participation in the promotion and development of Renewable Energy fuels, devices and

technologies .

5.17.3 Measures

- i. Establishing a financing mechanism which will support indigenous investments in renewable energy.
- ii. Putting in place other incentives, appropriate to the renewable energy sub-sector. This will promote indigenous private sector participation and competitiveness in the sub-sector.
- iii. Creating appropriate motivation through the Memorandum of Understanding with NGOs in the renewable energy sub-sector, for increasing the local content of value added in the activities of energy sector industries.

5.18 Bilateral, regional and international cooperation

Sierra Leone is involved in bilateral, regional and international arrangements in the domain of renewable energy and energy efficiency within the framework of its economic relations with other countries and multilateral institutions.

The nation's membership of sub-regional, regional and international organizations such as ECOWAS, APPA, AU, UN, IAEA and OPEC provides opportunity for it to play an active role in their renewable energy agenda. It is necessary to foster this multilateral cooperation for rapid national economic development. Sierra Leone's renewable energy resources potentials shall be deployed in promoting and enhancing regional and international co-operation for the overall economic and technological advancement of the nation. Sierra Leone shall also lay emphasis on fostering and strengthening renewable energy cooperation and integration within the ECOWAS sub-region.

5.18.1 Objectives

- i. Enhance Sierra Leone's effective participation in international renewable energy related organizations.
- ii. Facilitate the acquisition of technology for the development of the renewable energy sector.
- iii. Encourage a cooperative approach in the exploitation of renewable energy resources, and development of renewable energy supply infrastructure.

5.18.2 Policy statement

GOSL will seek national and international cooperation with relevant stakeholders to support the development and management of RETs in the country.

5.18.3 Measures

- i. Working out a co-coordinated approach to regional and sub-regional renewable energy planning based on cooperation and consultation among member countries of ECOWAS and other members of the African Union (AU).
- ii. Facilitating the establishment of mechanisms within the ECOWAS sub-region and other African countries to enhance energy trade and interchange of relevant technology and information.
- iii. Promoting favorable trading relationships with member countries of ECOWAS and the AU which will ease the financing of renewable energy supply, and other energy-related projects.
- iv. Ensuring Sierra Leone's active membership in renewable energy related regional and international organizations.
- v. Pooling available human resources through networking of national renewable energy training and research centers.

- vi. Encouraging the standardization of renewable energy related plants, renewable energy machineries and spares and the establishment of infrastructural facilities within the community for their production and certification.

5.19 Participation by Development Partners and NGOs

The Government is committed to mobilizing resources through international cooperation, towards the development of renewable electricity for sustainable development in Sierra Leone. Grant financing from agencies of government and independent foundations shall also be promoted.

5.19.1 Objectives

- i. Ensure that Development Partners and NGOs that are active in and interested in developing renewable energy in Sierra Leone are encouraged to do so in a well-coordinated manner.
- ii. Ensure the renewable energy programs being deployed by Development Partners and NGOs in Sierra Leone, have the desired impact and yield the desired result.
- iii. Ensure that Sierra Leone participates in renewable energy programs being rolled-out by NGOs, and to ensure that Sierra Leone's renewable energy competence is developed, as well.

5.19.2 Measures

- i. The Ministry of Energy shall annually engage all NGOs currently operating in the Sierra Leonean renewable energy sector, with the intention of having them articulate their annual renewable energy program targets.

- ii. The Ministry of Energy shall continually engage the NGOs to ensure close cooperation during the development of renewable energy projects.
- iii. Government shall encourage NGOs to support the renewable energy sub-sector by providing competence building tools and assessments, and capacity building trainings.
- iv. Government shall encourage NGOs to fund demonstration renewable energy projects and renewable energy feasibility studies through grants and donation.

5.20 Participation of local and foreign banks

Owing to other competing needs, the Government alone cannot continue to provide the major finance for developing the renewable energy sub-sector. Hence, public-private partnerships (PPPs) participation is necessary and imperative. To attract foreign investments in the renewable energy sub-sector, the sub-sector will first need to be developed to a certain extent, via indigenous participation. To attract domestic banking sector participation, efforts will be made to sensitize them to renewable energy and to incentivize their investments in lending to renewable energy projects.

6.0 POLICY OPTIONS OF RENEWABLE ENERGY

The renewable energy policies in Sierra Leone consist of four (4) renewable energy supply sources namely: hydropower, bioenergy, solar and wind.

6.1 Hydropower

6.1.1 Objectives

- i. Increase the percentage contribution of hydroelectricity to the total electricity generation.
- ii. Extend electricity to rural and remote areas, through the use of pico, micro and mini hydro power schemes.
- iii. Conserve non-renewable resources used in the generation of hydroelectricity.
- iv. Diversify the energy resource base and the mix between large, mini and micro hydro.
- v. Contribute furthermore to remote and off-grid power development in Sierra Leone.
- vi. Ensure minimum damage to the ecosystem arising from hydropower development.
- vii. Attract private sector investments into the hydropower sub-sector.
- viii. Develop socially acceptable and equitable hydro power.
- ix. Ensure the safety and security of large and small hydro generating facilities.

6.1.2 Policy statements

GOSL will harness the hydropower potential available in the country for electricity generation and ensure that its exploitation is done in an environmentally sustainable and socially acceptable manner.

GOSL will actively promote public private partnerships and indigenous participation in hydropower development.

GOSL will accelerate and accord high priority to planning and ongoing large hydro projects such as Bumbuna, Bekongo etc.

6.1.3 Measures

- i. Establishing and maintaining multilateral agreements to monitor and regulate the use of water in international rivers flowing through the country.
- ii. Ensuring increased indigenous participation and the application of gender mainstreaming in the planning, design and construction of micro, mini and large hydropower stations.
- iii. Providing basic engineering infrastructure for the domestic manufacturing of components of hydropower plants, equipment and accessories.
- iv. Encouraging the private sector, both indigenous and foreign, in the establishment and operation of mini and micro hydropower stations, under the electricity sector reforms initiative.
- v. Providing basic hydro resource assessment, a national hydro prospecting tool, and feasibility analysis of opportunities across the country.
- vi. Encouraging the private sector, both indigenous and foreign, in the local production of components of hydropower plants and accessories.
- vii. Establishing rural electricity boards to incorporate small-scale hydropower plants in their development plans.
- viii. Promoting and supporting Research and Development activities for the local adaptation of hydropower plant technologies.
- ix. Concluding studies and updating data on the hydro potential of our rivers and identifying all the possible locations for dams.

6.2 Bioenergy

6.2.1 Objectives

- i. Promote non-fuelwood biomass as an alternative energy resource, especially in the rural areas, and promote its usage for remote and off-grid power generation.

- ii. Promote efficient use of agricultural residues, municipal wastes, animal and human wastes and energy crops as bioenergy sources.
- iii. Reduce health hazards arising from the combustion of biomass fuel, especially fuel-wood combustion.
- iv. Promote efficient cooking technologies and alternative cooking fuels like biochar, briquettes etc.
- v. Conserve the forest resources of the nation.
- vi. Reduce greatly the percentage contribution of fuelwood consumption, to the domestic, agricultural and industrial sectors of the economy.
- vii. Arrest the ecological problems of desert encroachment, soil erosion and deforestation.
- viii. Facilitate the use of alternative energy resources from fuelwood specifically to increase the share of efficient charcoal production in line with the regional/ECOWAS target.
- ix. Increase the use of biofuels as a component in blended fuels sold at fuel pumps.
- x. Assess the volume of litter and manure from cattle farms that can be used in biogas generators or burned in incinerators.

6.2.2 Policy statements

GOSL will effectively harness non-fuelwood biomass and biofuel energy resources and integrate them with other energy resources.

GOSL will promote the use of efficient bioenergy conversion technologies.

GOSL will ensure the use of wood as a source of electricity shall be de-emphasized in the nation's energy mix.

GOSL will take measures to reduce the rate of deforestation and land degradation and minimize threats on climate change in the use of biomass resources.

GOSL will encourage agro based industries to produce electricity from their wastes.

GOSL will promote improved production and efficient use of fuelwood and charcoal.

6.2.3 Measures

- i. Developing extension educational and outreach programs to facilitate the general use of new biomass energy technologies.
- ii. Promoting Research and Development in bioenergy technology and cooking technologies and fuels.
- iii. Establishing pilot projects to produce biomass energy conversion devices and systems.
- iv. Providing adequate incentives to local entrepreneurs to produce biomass energy conversion systems.
- v. Training of skilled manpower and providing basic engineering infrastructure for the local production of components and spare parts for biomass systems.
- vi. Cultivating fast growing tree species needed to accelerate the regeneration of forests.
- vii. Developing appropriate technologies for the utilization of alternative energy sources from fuelwood.
- viii. Developing appropriate and affordable efficient wood stoves and promoting the introduction of more resource efficient alternatives in line with regional/ECOWAS target.
- ix. Encouraging the establishment of private and community wood-lots for supply of fuel-wood in the short-term.
- x. Establishing micro-credit facilities for entrepreneurs, especially for women groups, for the establishment and operation of commercial fuelwood lots and the production of renewable energy devices and systems.
- xi. Developing an appropriate pricing structure and feed-in tariffs to encourage substitution from fuelwood to renewable fuel types.

- xii. Establishing training programs on the use, maintenance and fabrication of efficient wood stoves and other renewable energy technologies.
- xiii. Organizing systematic public enlightenment campaigns on the problems of desertification and soil erosion arising from deforestation.
- xiv. Disseminating the renewable energy technologies to fuelwood through extension programs, pilot projects etc.

6.3 Solar energy

6.3.1 Objectives

- i. Increase the percentage contribution of solar energy to the total energy mix and to ensure a minimum electricity contribution of 10% and 20% are achieved by 2020 and 2030 respectively in rural areas.
- ii. Extend electricity to rural and remote/off-grid areas, by use of solar home systems and ultimately promote solar photovoltaic and solar thermal applications to ensure that solar energy can be of productive use.
- iii. Increase the share of Solar Water Heating technologies for social services, commercial and industrial processes.
- iv. Conserve non-renewable resources used in generation of electricity.
- v. Diversify the energy resource base of the nation.
- vi. Ensure minimum damage to the ecosystem.
- vii. Enhance Sierra Leone's domestic development of appropriate energy storage technologies.

6.3.2 Policy statements

GOSL will promote the use of efficient solar energy conversion technologies, such as use of photo-voltaic, solar-thermal and concentrated solar panels for power generation.

GOSL will promote solar energy generation for productive use.

GOSL will compliment solar power development with energy efficiency programs.

GOSL will develop safe disposal mechanism of all worn-out batteries from solar packs throughout the country.

GOSL will effectively harness solar energy resources and integrate them with other energy resources.

6.3.3 Measures

- i. Developing extension programs to facilitate the use of solar home systems.
- ii. Establishing projects to produce solar energy conversion devices and systems.
- iii. Sourcing and providing adequate incentives to local entrepreneurs to produce solar energy conversion systems.
- iv. Implementing a web-based solar prospecting tool that translates solar resources into potential power generation at local level. This would require updated renewable energy resource assessments to prepare for bankable projects.
- v. Developing skilled manpower and providing basic engineering infrastructure for the local production and maintenance of components and spare parts for solar energy conversion systems in line with regional/ECOWAS target.

- vi. Establishing micro-credit facilities for entrepreneurs, especially for women groups, for commercial solar energy facilities in remote and off-grid areas.
- vii. Developing an appropriate pricing structure and feed-in tariffs to encourage the development of concentrated solar power or similar projects.
- viii. Organizing systematic public enlightenment campaigns on the benefits of using solar home systems and solar water heating.
- ix. Establishing incentives for the domestic development and development of energy storage technologies.
- x. Conducting awareness campaigns on solar thermal systems to inform all relevant stakeholders and the interested population about the different applications of solar thermal energy and the related benefits.
- xi. Installing demonstration solar thermal systems for water heating in social institutions (hospitals, orphanages, homes for elderly people, etc.), to increase the hygienic standard of the social institutions and to reduce costs for water heating.
- xii. Establishing a national center of competence on solar thermal technologies.
- xiii. Establishing and implementing a national solar thermal technology platform (STTP), with links to similar platforms in other African countries
- xiv. Setting up technical assistance programs to local producers of solar thermal collectors

6.4 Wind energy

6.4.1 Objectives

- i. Develop wind energy as an alternative renewable energy resource.
- i. Develop local capability in wind energy technology.
- ii. Use wind energy for provision of power to rural areas and remote communities far removed from the national grid.
- iii. Apply wind energy technology in areas where it is technically and economically feasible to feed the grid.

6.4.2 Policy statements

GOSL will commercially develop its wind energy resource and integrate this with other energy resources into a balanced energy and electricity mix.

GOSL will ensure the development of indigenous small scale wind generating devices and energy storage devices.

6.4.3 Measures

- i. Encouraging research and development in wind energy utilization.
- ii. Developing skilled manpower for provision of basic engineering infrastructure for the local production of components and spare parts of wind power systems.
- iii. Intensifying work in wind data acquisition and development of wind maps and implement a web-based wind prospecting tool to encourage the implementation of wind projects.
- iv. Training of skilled local craftsmen to ensure the operation and maintenance of wind energy systems.
- v. Providing appropriate incentives to producers, developers and consumers of wind power systems.
- vi. Developing extension programs to facilitate the general use of wind energy technology.
- vii. Developing and implementing incentives for the development of wind farms and for the adoption of community-based wind systems off the grid.
- viii. Developing zoning and regulatory wind energy guidelines to prevent inappropriate public outcry against deploying wind energy installations.

6.5 Nexus energy-water-food

6.5.1 Policy statement

GOSL will ensure that the productivity and the availability of water, renewable energy, and crop land will be incorporated into a balanced development model

6.5.2 Measures

- i. Promote the use of photovoltaic water pumps.
- ii. Reduce the use of non-renewable energy in agro-food systems, by using agricultural wastes and solar energy to produce the energy needed for the food processing.
- iii. Promote the use of animal waste and manure for biogas production.
- iv. Support the development of energy recovery from wastewater, which can reduce the energy demand in the water treatment plant or even allow an export of excess energy to the power grid.
- v. Promote rainwater harvesting, micro-irrigation and groundwater re-charge schemes, to make irrigation of crops more energy and water efficient.
- vi. Promote the application of renewable energy and energy efficiency in (urban) public health services to reduce overall energy consumption, ensure a reliable energy supply and reap positive environmental side effects.
- vii. Set up a permanent dialogue process among stakeholders responsible for long-term strategies and planning of different water uses.
- viii. Actively participate in river basin scale policy dialogues on water and water-centred regional dialogues with neighboring countries with which Sierra Leone shares river basins.

7.0 PLANNING AND POLICY IMPLEMENTATION

Energy planning and policy implementation in the country takes place at three different levels. At the national level, they involve macro-planning and policy implementation as part of the multi-sectoral national development policies and plans which are the responsibilities of the Strategy and Policy Unit (SPU). Indeed, many agencies are involved in renewable energy. These include the MoE, MoFED, MoAFFS, MoEST, MoLCPE, and several entities beneath the afore-mentioned ministries. The Ministry with the most encompassing responsibility for renewable energy is the Ministry of Energy, as entities such as: Electricity Water Regulatory Commission (EWRC), the Electricity Generation and Transmission Company of Sierra Leone (EGTC) and the Electricity Distribution Supply Authority (EDSA) fall within its purview.

At the sectoral level, the Ministry of Energy is responsible for electricity policies, including renewable energy policies, which are clearly more electricity-related. However, other Ministries must be involved. The Ministry of Energy is therefore the appropriate lead agency for developing and implementing a renewable energy policy. The Ministry of Energy is involved in overall planning, development, monitoring and implementation of all policies for the electricity sector in all its ramifications. This function ensures consistency and alignment of the electricity sub-sectoral with the National Energy Policy and plans. The development and implementation of policies by any energy related Ministry must be consistent with provisions of the National Energy Policy which is coordinated by the Ministry of Energy.

At the sub-sectoral Level, more specific sub-sectoral planning and policy implementation for the development, exploitation and utilization of specific energy resources, are carried out in the various energy sub-sectors, Ministries Departments and Agencies, including established implementation agencies and other public and private operators. This policy document applies to issues at the sectoral level.

7.1 Planning framework

Provide vital input into national development planning and policy formulation; to ensure a sustainable development of the renewable energy sector, and a robust renewable energy policy and planning framework is defined.

7.1.1 Planning methodologies

- i. Integrated rural development, where electricity is treated as a component of infrastructure development.
- ii. Area coverage, where renewable energy will be planned to quickly reach as many customers within targeted areas as possible, using grid extension for households close to the grid, and renewable energy generation for remote/isolated areas.
- iii. Intensification, whereby focus will be placed on adding connections in electrified areas, whilst adding renewable power generation sources to the grid.
- iv. Complementary planning of renewable energy measures for optimization of effects.
- v. An important step is to understand where people live and how best to reach them, given existing infrastructure. This suggests distribution planning as the natural starting point for a national analysis.

7.1.2 Measures

- i. Strengthening cooperation between the Ministry of Energy and the other bodies active in the renewable energy and planning sectors.
- ii. Encouraging formal discussion and collaboration between institutions in the renewable energy and planning sectors whose activities are inter-related.

- iii. Establishing energy planning and implementation units at the Ministry of Energy and assigning responsibilities for energy related matters at local government levels.
- iv. Ensuring that the strategic plans and programs of the renewable energy sub-sectors are appropriately appraised with a view to ensuring consistency with the overall national energy policy and plans and resolving conflicts arising from sub-sectoral plans and programs.
- v. Establishing a national energy information system which will involve consistent data gathering and processing of energy resource inventory, consumption pattern, energy technologies, and other relevant socio-economic parameters.
- vi. Instituting an accelerated and effective manpower renewable energy development program.

7.2 Policy implementation

To achieve the stated policy objectives and successfully implement the strategies, various instruments including economic measures, information and education, legislative measures and institutional arrangements need to be used.

The aim of the program will be to create an enabling environment that provides for more responsibilities to be placed in the hands of decentralized energy service providers and rural organizations and stakeholders, and consequently increasing the likelihood that the program will succeed. The Ministry of Energy will assign clear responsibilities for off-grid system development, for instance in the context of power purchase agreements; and develop the necessary 'enabling environment' for renewable energy for electricity supply in remote and off-grid location programs to take root and prosper.

7.3 Short- medium- and long-term activities

The implementation process for this Renewable Energy Policy requires strategies that allow for many factors, including priority setting, policy continuity and a clear focus on key issues. Accordingly, such strategies should be based on realistic targets, a defined time frame as well as effective target evaluation. The advantages of this approach are two-fold:

- i. It will enable planners and implementing organs to include the cost of each strategy in their respective budgets, as they fall due;
- ii. It will aid monitoring organs to assess the progress of implementation of the various strategies.

In this regard and, in line with usual planning horizon, it is expected that short-term measures are those that could be evaluated within 1 to 2 years. A 5-year period is advocated for medium-term activities. With this perspective, the recommended activities are for the short-term horizon as indicated below:

- i. Prioritization of the policy strategies for implementation, with the setting of realistic targets and the effective monitoring and evaluation of the implementation process.
- ii. Developing and implementing the necessary machinery for constant monitoring of the implementation of the approved renewable energy and energy efficiency policy and compliance with the guidelines and regulations on various energy matters by all sectors of the economy.
- iii. Ensuring the implementation of fiscal measures necessary for the achievement of the set objectives of the renewable energy and energy efficiency policy.
- iv. Strengthening of all relevant regulatory agencies, to ensure the enforcement of an appropriate set of standards and procedures, including in particular standards and procedures on exploration, production and utilization of renewable energy and energy efficiency appliances.

- v. Improvement of the effectiveness of energy planning and implementation by establishing energy planning and implementation units at state government levels and assigning responsibilities for energy related matters at local government levels.
- vi. Enabling of private sector participation in the renewable energy and energy efficiency sub-sectors through the review of existing relevant laws and regulations.
- vii. Establishment of a strategy for the public awareness, education and participation in the realization of the goals and objectives of the renewable energy and energy efficiency policy.
- viii. Developing a framework for remote and off-grid power supply, based on the use of renewable energy.
- ix. Development and implementation of appropriate packages to enhance the utilization of renewable energy to solve rural energy problems and to make possible the extension of commercial energy and the associated technology to the rural sector.
- x. Monitoring and assessment of technological developments in all renewable energy areas and development of capabilities to apply them, as appropriate in the various sectors of the economy.
- xi. Updating memorandum of understanding to ensure that it contains appropriate incentives that will attract investments in the renewable energy sub-sector.

7.4 National Renewable Energy Action Plan (NREAP)

There are key factors that are critical to the effectiveness of any renewable energy policy without which the likelihood of success in implementation is little to none. These factors may include:

- i. Public Benefits Fund (PBF) based on penalties of companies not meeting standards with a portion of the tariff designed to support renewables.
- ii. Incentives such as:
 - a. Appropriate Feed-in Tariffs (FiT), that will allow generators of renewable energy to obtain preferred pricing and rates as they sell,
 - b. Power Production Tax Credit (PTC),
 - c. Generation Disclosure Requirement (GDR), and
 - d. Grants to communities to spur the adoption of community-based renewable energy processes.
- iii. Government budgetary backing to support the activities of key players in the implementation of a Renewable Energy Policy.

In addition to developing a definitive framework for implementing the policies and strategies contained in this document, all the above-mentioned factors must be put in place to strengthen Sierra Leone's RE policy.

Policy Strengthening and Strategy Articulation represent the first step in moving forward. It is essential to task all relevant agencies to do their part and compel them to swiftly implement specific items tasked to them. Therefore, the Minister of Energy shall develop a task list from items in this policy for each Ministry, Department and Agency to implement. The Minister shall also empanel a watchdog group to coordinate these activities, amongst other assignments. The process shall, following the ECOWAS Policies on Renewable Energy, produce two products within the next 6 to 12 months: (a) National Renewable Energy Action Plan (NREAP) along with rearticulated objectives, policies and strategies; and an Integrated Resource Plan for electricity (IRP) which will serve as basis for a National Policy on Renewable Energy.

This policy document therefore directs the Minister of Energy to implement the following key activities that will work to ensure successful completion of a National Policy on Renewable Energy:

- i. The development of a National Renewable Energy Act, national energy research institutions and the National Renewable Energy Action Plan

- (NREAP) to be completed within 6 to 12 months of the adoption of this document,
- ii. The preparation of a 15-20-year integrated electricity resource plan (IRP) that will include NREAP components,
 - iii. The creation and empaneling of a Monitoring and Evaluation watch dog group from a consortium of stakeholders to achieve the following:
 - a. Monitor the development of NREAP for 12 months;
 - b. Develop Monthly Progress Reports;
 - c. Declare a renewable energy (RE) 2030 benchmark;
 - d. Prepare a 15-20-year integrated electricity resource plan (IRP) that includes NREAP components to be completed within 12 months of the adoption of this policy;
 - e. Ensure that the NREAP passes a benefit/cost test;
 - f. Long-term monitoring and reporting of accomplishments in renewable energy; Long-term advocacy for renewable energy targets.
 - iv. The creation of (along with the Minister of Finance and Economic Development and other entities that are involved in the budgetary process):
 - a. A budget per year for the M & E group;
 - b. A reasonable budget to support all other activities needing government budgetary allocation in the National Policy on Renewable Energy.

The National Renewable Energy Action Plan (NREAP) provides a detailed roadmap of how Sierra Leone expects to reach its targets for development of the renewable energy sector. This action plan is to set out energy benchmarks on the status quo. It will propose sectoral targets, the technology mix expected to be used, the trajectory to follow, the measures and reforms that will be developed to overcome the barriers to developing renewable energy. The NREAP will set target year and interim target year quotas for renewable energy as well as define incentives such as FIT, PBF, Power PTC, etc. This document should be completed within six (6) months of the adoption of this policy.

EWRC and other relevant agencies will work with the Monitoring and Evaluation Group to define penalties and modalities for instance of the FIT, PBF, etc., to recommend to the Minister of Energy. Under this directive, EWRC will complete this action within three (3) months of the completion of the Action Plan. The Renewable Energy Action Committee that will be set-up within the Monitoring and Evaluation Group will be responsible for delivering NREAP.

7.5 Monitoring and evaluation

The Monitoring and Evaluation Group will be made up of a consortium designated by the Minister of Energy. Subcommittees will include the Renewable Energy Action Committee and the Energy Efficiency Taskforce as well as other members delegated by the Minister of Energy.

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