



Economic Commission for Africa  
Southern Africa Office

The Government of Sierra Leone  
Ministry of Energy and Power

# National Energy Policy for Sierra Leone



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Addis Ababa, Ethiopia

# Table of Contents

Acronyms.....	v
Foreword.....	vii
Executive Summary.....	ix
<b>Part I: Policy Background .....</b>	<b>7</b>
Chapter 1. Introduction .....	7
1.1 General Background .....	7
1.2 The need for an energy policy.....	10
1.3 The context for the energy policy.....	11
1.3.1 Existing economic, social and environmental policy frameworks.	12
1.3.2 Linkages with other sectors .....	14
1.3.3 International and regional linkages .....	14
1.3.4 Approach to the policy formulation .....	15
Chapter 2. The Energy Sector in Sierra Leone .....	17
2.1 Overview of the energy sector .....	17
2.2 Institutional framework .....	18
2.3 Energy resources of Sierra Leone .....	20
2.3.1 Fossil fuels (Hydrocarbons).....	20
2.3.2 Renewable energy resources .....	21
2.4 Energy Supply and Demand .....	23
2.4.1 Energy Supply .....	23
2.4.2 Energy Demand .....	28
<b>Part II: Policy Objectives and Challenges of the Energy Sector .....</b>	<b>33</b>
Chapter 3. Policy Objectives and Challenges of the Energy Sector .....	33
3.1 Vision .....	33
3.2 Main policy goals and targets.....	33
3.3 The Challenges of the Energy Sector.....	34
3.3.1 Broad challenges .....	34
3.3.2 Sub-sectoral challenges.....	35
3.3.3 Petroleum sub sector.....	36
3.3.4 Renewable energy, including fuelwood and charcoal.....	37
3.3.5 Energy efficiency and conservation .....	39
3.3.6 Legal and Regulatory Framework .....	41

<b>Part III: Transformation of the Energy Sector: Policy Options and Strategies .....</b>	<b>43</b>
<b>Chapter 4. Supply Side Policy Options and Strategies .....</b>	<b>43</b>
4.1 Electricity power sub-sector.....	43
4.2 Petroleum sub sector (Upstream and Downstream activities) .....	45
4.2.1 Upstream activities.....	45
4.2.2 Downstream activities.....	45
4.3 Renewable energies sub sector (Fuel wood and other biomass sources of energy) .....	47
<b>Chapter 5. Demand-side Policy Options and Strategies.....</b>	<b>49</b>
5.1 Households and institutions (both rural and urban areas) .....	49
5.2 Industry and Commerce .....	51
5.3 Mining .....	52
5.4 Transport.....	53
5.5 Agriculture Sector .....	54
5.6 Rural energy issues.....	55
<b>Chapter 6. Governance and Other Cross Cutting Issues .....</b>	<b>57</b>
6.1 Energy Governance: Coordination and rationalization of responsibilities .....	57
6.2 Energy Planning .....	58
6.3 Fiscal and pricing policy .....	59
6.4 Financing energy investment.....	59
6.5 Energy information systems and dissemination.....	60
6.6 Energy efficiency and conservation .....	60
6.7 Energy and environment.....	61
6.8 Research and Development.....	62
6.9 Gender and Energy.....	62
6.10 Capacity building and capacity development .....	63
6.11 International and regional energy trade and cooperation.....	64

<b>Part IV: Guidelines for an Action Plan.....</b>	<b>65</b>
Chapter 7. Guidelines for an Action Plan .....	65
7.1 Defining priority actions.....	65
7.2 Determining the time frame .....	67
7.3 Determining the quantum of investment required and establishing performance indicators .....	67
7.4 Establishing monitoring and evaluation mechanisms .....	68
7.5 Identifying sources of financing .....	69
7.6 Identifying the major actors .....	69
 <b>Part V: Conclusion and the Way Forward.....</b>	 <b>71</b>
Chapter 8. Conclusion and the Way Forward .....	71
Appendix .....	73
Appendix 1 .....	73
Programme of Intervention Measures in Energy Sector* .....	73

## Acronyms

AfDB	African Development Bank
BHEP	Bumbuna Hydroelectric Project
BKPS	Bo-Kenema Power Services
BRET	Business involved in RETs in Sierra Leone
CSO	Civil Society organizations
CSSL	Conservation Society of Sierra Leone
EA	Electricity Africa
EIA	Environmental Impact Assessment
ECOWAS	Economic Community of West African States
EFA	Environmental Foundation for Africa
ENFOSAL	Environmental Foundation for Sierra Leone
EU	European Union
FAO	Food and Agricultural Organization
FII	Financing and Insurance Institutions
GOSL	Government of Sierra Leone
GTZ	German Technical Services
HP	House of Parliament
IMF	International Monetary Fund
IPPs	Independent Power Producers
LC	Local Councils (LC)
LPG	Liquid Petroleum Gas
MAFFS	Ministry of Agriculture, Forestry and Food Security
MEP	Ministry of Energy and Power
MEST	Ministry of Education Science and Technology
MF	Ministry of Finance
MFAIC	Ministry of Foreign Affairs and International Cooperation
MFO	Marine fuel Oil
MHS	Ministry of Health and Sanitation
MIB	Ministry of Information and Broadcasting
MLCPE	Ministry of Lands, Country Planning and the Environment
MMR	Ministry of Mineral Resources
MOTC	Ministry of Transport and Communication

MOUs	Memoranda of Understanding
MLGRD	Ministry of Local Government and Rural Development
MSWGCA	Ministry of Social Welfare, Gender and Children's Affairs
MTI	Ministry of Trade and Industry
MWTS	Ministry of Works and Technical services
MYS	Ministry of Youth and Sports
NCP	National Commission for Privatization
NDMC	National Diamond Mining Company
NEPPCU	National Energy Policy Planning and Coordinating Unit
NP	Sierra Leone National Petroleum Company
NPA	National Power Authority
NRA	National Revenue Authority
PIU	Project Implementation Unit
PO	President's Office
PPIAF	Public Private Infrastructure Advisory Facility
PRSP	Poverty Reduction Strategy Paper
PSTP	Power Sector Transformation Project
PU	Petroleum Unit
RAP	Resettlement Action Plan
RETs	Renewable Energy Technologies
RTA	Sierra Leone Road Transport Authority
SALWACO	Sierra Leone Water Company
SLAA	Sierra Leone Airports Authority
SLMA	Sierra Leone Maritime Administration
SLPA	Sierra Leone Ports Authority
SLRA	Sierra Leone Roads Authority
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
USAID	United State Agency for international development
WB	World Bank

## Foreword

The completion of the formulation of the first Energy Policy document for Sierra Leone at this late stage in our country's post independence history is nevertheless timely when one considers the challenges faced with post war reconstruction and development. As the government, assisted by its international development partners grapples with several social and economic problems exacerbated by the country's eleven year-long civil conflict, there is the acute realization that development effort could be strangled if energy requirements for households, industry and commerce in urban and rural areas, for poor and non poor are not seriously addressed. .

The importance of energy for economic development is a fact. Regrettably however the major efforts of the government in the energy arena have been veered towards the provision of electrical power which is accessible to less than 10% of the population. The vast majority of Sierra Leoneans depend on fuelwood and charcoal for their energy needs. Despite the abundance of renewable energy resources, their use is limited except for fuelwood. A combination of factors, the most important of which is the poor coordination and the absence of any central planning have resulted in the poor state of the energy sector.

A major setback with energy has been the fact that we have concentrated on preserving the status quo in terms of sector governance and other actions that are necessary to improve the sector's performance. It is with this realization that reforms are being undertaken in the various sub sectors. The electricity sector, in particular, has started the reforms necessary to introduce private sector participation.

The need to have an energy policy that encapsulates all the energy sectors, exploiting synergies and charting the way forward that will result in overall economic development is, therefore, timely. The policy formulation process involved various stakeholders in the sector.

Several policy actions have been proposed based on the policies outlined. Many of these need legislative actions, changes in governance structures and financing. My Ministry is committed to working with other Ministries, agencies and stakeholders to ensure that action is taken to implement policy measures in a timely fashion. My colleague Ministers and I are confident that this will lead to a drastic improvement in sector performance and contribute to economic development.



On behalf of the Ministry and the Government of Sierra Leone I wish to thank UNECA for funding this study and the CEMMATS consulting team for carrying out the study. Many thanks are also extended to many resource people and stakeholders who participated in the stakeholders' meetings. I also thank the Permanent Secretary in the Ministry and his Deputy who were very instrumental in carrying out work related to this study.

This policy document will, undoubtedly, be very helpful to government in striving to reduce poverty and improve the economy.

Minister of Energy and Power

# Executive Summary

The Government of Sierra Leone has decided to have a national energy policy that will serve as a policy instrument for the development and more efficient management of the country's energy sector. For this purpose, the United Nations Economic Commission for Africa (ECA) in close consultation with the Government commissioned this study on the formulation of a national energy policy for Sierra Leone.

The study assesses the current development and management of the energy sector in the country and identifies the challenges and other issues to be addressed in order to meet the stated policy goals and targets. It then makes some proposals for policy recommendations and strategies that need to be implemented so as to ensure reliable and affordable energy supply to all sectors of the economy in an environmentally sound manner.

## Vision

According to the study, the vision of the energy sector of Sierra Leone should be to ensure that high quality modern energy services are accessible, affordable and available throughout the country, while minimizing negative environmental impacts.

## Major policy goals

To realize this vision, the Government should endeavour to meet the following policy goals:

- Produce on a sustainable basis, adequate modern energy supply to meet the development aspirations of the country.
- Provide electricity at affordable prices everywhere in the country.
- Ensure uninterrupted supply of petroleum products throughout the country at affordable prices.
- Provide environmentally friendly, affordable household energy on a sustained basis.
- Develop indigenous fossil and renewable energy sources for the country, especially to utilize such sources for the country to meet its MDGs by 2015

## Major challenges

Sierra Leone is facing serious challenges in meeting the above goals because the energy sector is very weak. Access to electricity is largely limited to the main towns, and access to transport fuels is also limited. Ensuring the provision of these energy services nationwide at an affordable price is an uphill task because of major financial, technical

and institutional challenges. Despite the fact that the country has significant energy resources, financial, technical and environmental challenges have restricted the pace at which these resources have been developed.

In addition, there are other key challenges that need to be addressed in order to improve on the management and overall efficiency of the energy sector. These include:

- Lack of coordination of the various energy sub sectors and consolidation of some functions, resulting in poor linkages with related sectors;
- Inadequate coordination and information sharing among the various projects, government institutions and the private sector;
- Inadequate energy information system including accurate data on energy supply and demand as well as the country's resource potential;
- Inefficient production, supply and use of energy;
- Budgetary and financing constraints; and
- Lack of appropriate mechanism to ensure the supply and use of modern and efficient energy services to the rural population.

In the electric power sub-sector, major challenges faced include poor performance of National Power Authority (NPA), fuel cost, the age of the machines resulting in low efficiency of power generation, frequent power outages resulting in reduced services to customers, and inadequate capacity expansion to meet demand. As a result, the sector is also facing such challenges as widespread recourse to private auto generation, lack of power supply in rural areas, absence of a national grid, extremely high system losses, high tariffs and electricity theft.

In the petroleum sub-sector, major challenges include: problems of foreign exchange and guarantee arrangements required to finance procurement of petroleum products, relative low quantities of petroleum products requirements, supply difficulties with bottlenecks in allocation or chartering of vessels and maintenance of vessels, product storage limitations, transportation problems in distributing and marketing of petroleum products nationwide, problem of adulteration/contamination, as well as inadequate regulation of the sub-sector requiring monitoring and enforcement powers.

In the household energy sub-sector, the majority of Sierra Leoneans are heavily depend on traditional fuels in the form of firewood and charcoal for their cooking needs. Because of the many problems associated with the production and use of this energy source, there is need for shifting to energy of a higher quality for cooking such as kerosene and LPG. The intense indiscriminate destruction of forest areas and grasslands in the mountainous areas in the city and in some sub-urban areas needs to be addressed.

## Energy Supply Policy Options

### **Electric power sector**

To increase access to safe, reliable, efficient, affordable and sustainable power supply for all Sierra Leoneans while meeting the national economic and social development needs, the Government shall:

- Establish an adequate and transparent, legal and regulatory framework that is conducive to local communities and private sector participation for the development of the energy sector;
- Establish an adequate and transparent, legal and regulatory framework that is conducive to local communities and private sector participation for the development of the energy sector;
- Develop a national grid that will extend the transmission line throughout the country;
- Promote entry of multiple players in the power generation including private and public investors as Independent Power Producers
- Embark on different options for financing and operating rural electrification programmes;
- Encourage the development of mini/micro hydro sites and other renewable energy technologies through different arrangements including public/private partnership arrangements.
- Encourage proposals by local authorities to provide and distribute power and will propose parameters for local government;.
- Actively participate in regional and sub-regional programmes that are aimed the supply of electricity; and
- Institute measures aimed at improving the efficiency of the supply side including reduction of electricity theft.

### **Petroleum sector**

To ensure an adequate and reliable supply of high quality petroleum products for all sectors of the economy at internationally competitive and affordable prices within appropriate health, safety and environmental standards, the Government shall:

- Work with its sub-regional neighbours to explore joint procurement of petroleum products;
- Keep appropriate levels of strategic stocks based on an assessment of the risk of supply disruption;
- Encourage petroleum companies to extend their marketing networks to rural and smaller towns in various parts of the country;
- Lend its support to schemes that will enhance cost reductions in the procurement of large stocks of petroleum products;
- Commission a study to assess the economic viability of operating the existing oil refinery; and

- Ensure the institution of uniform petroleum products pricing policy countrywide.

### **Traditional fuels and other Renewable energy sources**

To encourage and promote the sustainable use of fuelwood and encourage the possible introduction of substitution fuels, the Government shall ensure that biomass conversion and end-use technologies are improved.

To promote the development and use of renewable energy resources based on detailed study and analysis of their technical and economic feasibility, the Government shall:

- support Research and Development work in renewable energy sources and associated technologies; and
- ensure that environmental considerations are included in all renewable energy planning and implementation co-operation is enhanced with other relevant stakeholders.

## **Energy Demand Policy Options**

### **Households and public institutions**

There is need to increase access to reliable and affordable energy services in a sustainable manner for households and institutions, especially those involved in water supply and sanitation, health, education, public lighting and communication in order to improve the welfare of households and the operation of these institutions.

To this end, the Government shall:

- Encourage the use of efficient end-use technologies in households and public institutions;
- Encourage the use of alternative sources of energy for cooking, heating, cooling, lighting and other applications;
- Set up regulation and safety standards to ensure safety of household energy appliances;
- Set up appropriate financial and administrative institutions to manage RETs;
- Consider incentive schemes such as reduction of taxes and giving out waivers for development and importation of RETs;
- Promote energy auditing in public institutions to identify areas of energy efficiency intervention and/or energy substitution as found necessary;
- Encourage promotion and provide necessary incentives to actively pursue the local manufacture of RET-based systems.

### **Industrial and commercial sector**

There is need to cater for the power needs of industrial and commercial sectors and introduce energy efficiency measures in these sectors so as to result in overall financial and environmental benefits that will improve their competitiveness.

To this end, the Government shall:

- Adopt measures to improve the quality and cost effectiveness of energy supplied to the industrial and commercial sectors;
- Promote energy management practices and regulated involvement of the sector to improve compliance; and
- Encourage the efficient use of alternative energy sources.

### **Mining sector**

There is need to facilitate access by mining companies to reliable energy that will result in increased efficiency and output. To this end; the Government shall enter into partnership with Mining companies in the development of high quality energy and to improve access.

### **Transport sector**

There is need to promote efficient and environmentally-friendly transport system that will optimize the utilization of petroleum fuels to all parts of the country.

To this end, the Government shall:

- Promote measures to encourage efficient mass transport systems with greater participation of the private sector; and
- Provide adequate transport fuels for the transport system of the country.

### **Agriculture sector**

There is need to increase the use of modern energy in the agricultural sector so as to increase agricultural production, and achieve the country's food security objectives.

To this end, the Government shall:

- Promote measures that will ensure sufficient energy supply to meet the increasing demand in the agriculture sector and promote industry, thereby creating employment and economic growth; and
- Create an enabling environment for all stakeholders engaged in research and development, the distribution and use of energy products and development of appropriate energy technologies for agriculture.

### **Rural energies**

The problem of rural energy supplies has not received the attention it deserves in the context of the country's reconstruction and modernisation programme. Therefore, there is need to improve on the traditional methods of supplying energy to rural areas and take measures to markedly improve on the provision of commercial energy

services so as to contribute meaningfully to the social and economic development of rural areas.

To this end, the Government shall:

- Establish a rural electrification strategy and plan to address all aspects of rural electrification and power needs while making use of the institutional structures of local councils and other stakeholders;
- Set up a rural electrification fund that will be accessed by all rural communities
- Support research and development in the area of rural energy;
- Promote the application of alternative energy sources other than fuelwood and charcoal in order to reduce deforestation, indoor health hazards and time spent by rural women in search of firewood;
- Endeavour to facilitate increased availability of energy services, including grid and non-grid electrification to rural areas;
- Establish norms, codes of practice, standards and guidelines for cost effective rural energy supplies; and
- Set up mechanisms for the involvement of private stakeholders to participate in the different rural energy development schemes.

## Energy Governance

The development and management of the energy sector has long suffered from lack of appropriate policy, institutional, legal and regulatory framework. Therefore, there is need to institute a new governance structure for the energy sector that would meet the challenge of developing a coherent and clear framework of energy governance, which addresses in an integrated manner, the key issues that will guide the effective implementation of the energy policy.

To this end, the Government shall:

- Review existing institutional arrangements with a view to improving coordination of actions of the various institutions and ensuring the efficient management of the energy sector; and
- Institute mechanisms to facilitate the effective implementation of the energy policy and in so doing achieve the economic, social and political goals

## Policy recommendations on crosscutting issues

Policy recommendations are made on such crosscutting issues as energy planning, energy pricing and fiscal policy, financing energy investments, energy information systems and dissemination, energy efficiency and conservation, energy and

environment, gender and energy, R&D in the energy field, capacity building and capacity development, and international and regional energy cooperation.

## Guidelines for an Action Plan

Finally, the study outlines elements and issues for consideration in the preparation of an Action Plan once the national energy policy is approved by relevant policy organs.



# Part I: Policy Background

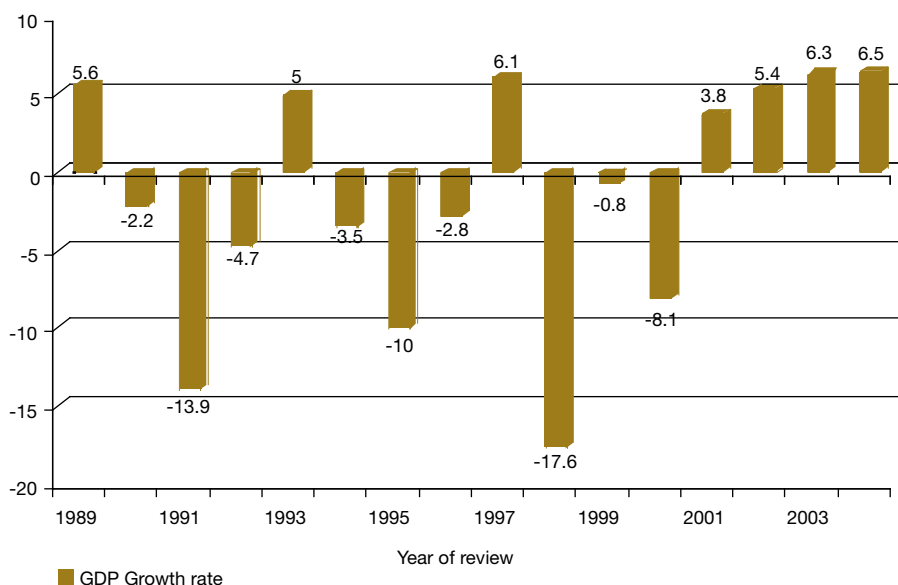
## Chapter 1. Introduction

### 1.1 General Background

Sierra Leone, with a land area of 72,325 km<sup>2</sup>, is bordered in the Northeast by the Republic of Guinea, in the South and Southeast by the Republic of Liberia and in the West by the North Atlantic Ocean. The current population is estimated at 5.6 million and growing at an annual rate of 2.6%. The climate of Sierra Leone is described as wet tropical monsoon with a single wet season each year. The average annual rainfall is about 2540 mm. There are two distinct seasons: the wet season, which lasts from May to October, and the dry season from November to April. Normal temperature range is 21°C to 33°C although it can drop to as low as 10°C at night during the Harmattan season in January. Day temperatures average 31°C in the dry season and 28°C in the wet season. The country has a long coastline of 465 km along the Atlantic Ocean. It is divided into four (4) main geographical regions: the coastline, interior lowlands plains, interior plateau and the mountains. The main rivers include Great Scarcies, Little Scarcies, Rokel, Jong, Sewa, Moa and Mano.

Sierra Leone's economy was severely affected by the 11-year rebel war, which was formally declared over in January 2002. The moderate economic gains achieved between independence in 1961 and 1980 were reversed in the 1980s. The decline in the economy could be attributed to a combination of factors which include poor governance and management of the economy, inappropriate economic recovery programmes and weak export prices in the face of higher import prices. This situation was worsened by the rebel war, which brought about the devastation of infrastructure, the economy, many facets of the nation's social fabric and resulted in the displacement of a large section of the populace. The weak economic performance is reflected in the country's GDP per capita. It dropped from US\$380 in 1980 to US\$237 in 1990 and US\$142 in 2000. The negative annual growth rates of -13.9% in 1990/91 and -17.6% in 1998 clearly illustrate the economic impacts of the war. However, there has been a steady rise in growth rates from 2001 to 2004. The growth rates increased from 3.0% in 2001 to 5.4% in 2002 and this trend continued to 6.3% in 2003 with an expected growth of 6.5% in 2004. This steady rise reflects the continuing recovery of various sectors of the economy. The improvement has been reflected in the increase in GDP per capita which rose from US\$142 in 2000 to US\$160 in 2002 (UN, 2001). Fig 1 shows the trend in GDP growth rate for the period 1989-2004.

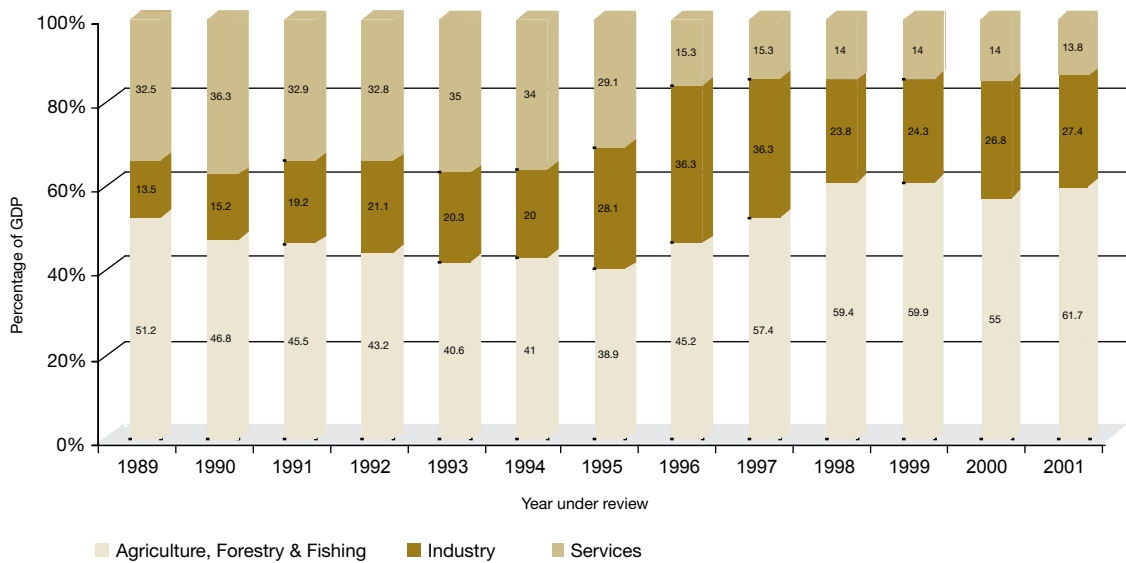
Figure 1. GDP Growth rate : 1989 - 2004



Source: Research Department, Bank of Sierra Leone

The Sierra Leone economy has always been largely based on the exploitation of natural resources, notably agricultural, marine and mineral resources. Public sector influence has been pervasive in economic activities. There is a huge imbalance between imports and exports. The economy is dominated by the agriculture sector, which accounts for 44.1% of the GDP<sup>1</sup>. Agriculture has however remained traditional and subsistence in character, incapable of satisfying the food requirements of the country by a wide margin. Over 75% of the country's labour force is employed in agriculture<sup>2</sup>. Industry accounts for 24.4 % of the GDP and services 27.1%<sup>2</sup>. The country has vast mineral resources and the mining sector accounts for over 20% of the GDP.

Figure 2. Percentage of GDP by activity : 1989 - 2001



Source: Research Department, Bank of Sierra Leone

The impact of the Structural Adjustment Programme (SAP) initiated in 1989/90 as advocated by the World Bank/IMF on the overall economy has been mixed. The cardinal pillars of the SAP included trade liberalization, stabilization of the exchange rate, removal of subsidies on petroleum products and the removal of the subsidy on the staple food, rice. Strategies such as the planned privatization of parastatals and restructuring of the Civil Service for more efficient services are being implemented. The overall benefits of this programme are not yet readily apparent to the majority of the citizens.

The government is implementing several measures aimed at addressing the factors responsible for the difficulties plaguing the economy. These factors can be categorized under the headings of **poor governance, inappropriate social and economic policies and weak international prices for the country's main exports.**

The government realizes the need to put policy measures in place that will result in improved energy services which are essential for socio economic development. This realization led to this UNECA- funded study at the requested of the Government of Sierra Leone.

In formulating the policy document, it is realized that policies are being constructed within certain contextual settings which have been outlined. A situational analysis of the energy sector, the analysis of key issues in the sector and charting of strategic

directions for the management of the sector should precede policy options for the transformation of the sector. Stakeholder consultation has therefore been a key element in the policy formulation process.

## 1.2 The need for an energy policy

Sierra Leone has just emerged from civil conflict that virtually paralysed the economy. Most of economic and social infrastructure, including energy-related facilities were destroyed during the conflict. As the country embarks upon a post conflict development process and modernisation of its economy, there is need for the energy sector to make decisions that ensure appropriate energy supply and use. This will not only move the country to economic prosperity but will ensure a higher quality of living for the majority of Sierra Leoneans on a sustained basis.

The country is reasonably well endowed with energy resources, particularly biomass energy (forestry), hydropower resources and solar energy. Presently, exploration for petroleum resources is ongoing along the coastline of the country. If these resources are well managed, they can play a catalytic role in sustaining the development aspirations of the country. Also a significant share of the country's resources is used to import petroleum products. The availability and price of various petroleum products impacts on various areas of the economy and quality of life of the populace. The need for appropriate policies in this area is paramount.

Institutional deficiencies represent major obstacles to the efficient and reliable supply of both traditional and commercial energy in the country. The energy sector is managed by several institutions that are largely divided by energy source with hardly any well co-ordinated mechanism. No single institution is responsible for formulating and coordinating energy sector policy. As a result, traditional energy supply and use are largely ignored, while commercial fuels, though receiving attention are focused on urban areas that use most of these fuels. The energy needs of the majority of the population who live in rural areas and depend largely on traditional energy-mostly biomass energy have largely been ignored. This has had a negative impact on the economy because of the pivotal role of rural areas in the economy. Establishing effective energy governance will therefore greatly enhance the energy sector.

Access to reliable and affordable modern energy services is a prerequisite in meeting the Millennium Development Goals (MDG) as advocated by the United Nations, which aims to reduce global poverty by half by 2015. Improving access to modern energy to the majority of people of Sierra Leone is important, but cannot be achieved without appropriate energy decisions regarding supply and use. Further, in the constitution of Sierra Leone, one of its economic objectives states that the country shall "harness all natural resources of the nation to promote national prosperity in

an efficient, dynamic and self-reliant economy". An energy policy that exploits the vast potential for energy from biomass, hydro resources and other renewable energy resources is certainly geared towards meeting this economic objective. The need for an appropriate energy policy is also recognised by a major ongoing programme in the country, the Poverty Reduction Strategy Paper (PRSP). Energy access is one of the key sectors that have been studied.

In realising Sierra Leone's socio-economic objectives, it is necessary to adopt a policy that has short, medium and long-term perspectives on how to address the energy needs of the country. Also an environment must be created for the sustainable supply of affordable energy services. A critical factor in this direction will be improvement in the governance of the sector including the efficient management of the sector, affordability of the service and widened access to cover the rural productive sectors.

### 1.3 The context for the energy policy

The energy policy of Sierra Leone can be contextualised within the achievement of two major goals, namely following a sustainable development path in the future and reducing poverty as a whole. However, both goals are interlinked because the three pillars of sustainable development are economic, environmental and social aspects of sustainability. Hence, in discussing these pillars with respect to energy, aspects of reducing poverty will also be discussed. Achieving economic sustainability involves embarking on an economic growth that does not only reflect economic efficiency but also equitable distribution of gains from such growth as this would lead to economic stability. Social sustainability involves establishing a more equitable and just society, which inherently involves reducing poverty while acknowledging the cultural heritage of the society and empowering the people to increase their participation in decision making. Environmental sustainability involves exploiting the natural resource base in a manner that will result in minimum environmental pollution of the common goods (land, water and air). Satisfying the different types of sustainability inherently addresses poverty reduction measures; therefore developing energy policies within a sustainable development framework will enhance the goals set by the country. Hence, discussing the interlinkages between energy and these three pillars will provide the context of the energy policy of the country.

Energy is the cornerstone of any development process and therefore should be seen as having links with the other sectors of the economy. These links will be discussed as a background. The small size of national economies in Africa necessitates cooperation among different countries and the realization of this feature has led to the formation of several regional bodies of which Sierra Leone is a member. These bodies all have energy as one of their programmes. Due to the interlinkages between the energy sector and other sectors, and the regional and international nature of the energy sector, these

two issues are discussed as well. The context of the energy policy will therefore be considered within the following:

- The existing economic, social and environmental policies
- The nature and linkages of the energy sector with other sectors.
- International and regional linkages of the sector.

### 1.3.1 Existing economic, social and environmental policy frameworks

#### 1.3.1.1 Economic framework

Sierra Leone's substantial mineral, agricultural, and marine resources, these remain largely underdeveloped. Agriculture is mainly subsistence in character, the sector engaging over two-thirds of the population, but food imports are significant. Manufacturing is limited to processing of raw materials and production of light goods mainly for the domestic market. Many economic sectors like mining and tourism, severely affected during the war are being slowly resuscitated. The country still depends to a large extent on donor funding of its budget.

Sierra Leone embarked upon a Structural Adjustment Programme (SAP) in 1989/90 endorsed by the Bretton Woods Institutions, the main objectives of which included: a) to achieve and maintain a stable macroeconomic environment; b) to redefine the public sector's role while restoring the government's capacity to provide basic services; and c) to create an economic environment conducive to private sector development with a predictable transparent and fair regulatory framework. To realize these objectives the government embarked upon the liberalization of trade and exchange rate, price deregulation, strengthening fiscal management and domestic resource mobilisation, elimination of subsidies, streamlining the Civil Service and the divestiture of State Enterprises. These objectives and strategies still constitute the basic framework of Government's economic reform policy. Unfortunately, these policies are yet to yield the expected results.

The government is seriously committed to the divestiture of State Owned Enterprises, including the National Power Authority, the state owned utility. This activity is being supervised by the National Commission on Privatisation, which was established through an Act of Parliament.

The government has also embarked on an ambitious programme to achieve food security by 2007. Agriculture is a priority and a quantum leap is needed for it to move from its state of subsistence to mechanization. This will require the appropriate energy policy that will incorporate the considerable input of energy required for

such agricultural practices. Other measures being undertaken to create an enabling environment for investing in Sierra Leone, such as the new Investment Code, will result in increased investments in the industrial and commercial sectors which will also require considerable input of energy.

### **1.3.1.2 Social development framework (including Poverty)**

The government is presently in the throes of completing its Poverty Reduction Strategy Paper (PRSP). The poverty reduction programmes aim at economic and social empowerment of the poor and creating an enabling environment for development, through investment in transportation, communications, energy and other economic, social and physical infrastructure.

The government intends to reduce extreme poverty by half by the year 2010. The overall vision, according to Vision 2025, is total poverty eradication by the year 2025. Vision 2025 aims at developing “a healthy and well-educated society with a high quality of life”. Access to affordable energy services is vital in all spheres of the social sector. Energy use and wealth are interrelated. The wealthier the populace the higher its energy demands and the higher it moves up the energy ladder in terms of its consumption patterns and choice of fuels. For example, transport patterns are changed from walking to using public transport and eventually owning a car. Transition from use of traditional fuels to modern fuels accords the end-users time to undertake more productive endeavours such as education, greater attention to healthcare and recreational activities. Opportunities are also provided for small and medium scale industries to create wealth for the community.

There is evidence that the desire for more efficient fuels is a reality in rural communities and that affordability and availability are key hurdles to the energy transition process. It is therefore imperative to look into the problems that may delay this transition with a view to providing pre-emptive work plans through policy enactment.

### **1.3.1.3 Environmental framework**

Sierra Leone has a National Environmental Policy that was instituted in 1990 and subsequently revised in 1994. The objective of this policy is to achieve adequate environmental quality for all Sierra Leoneans, conserve and use environmental resources on a sustained basis while maintaining its ecosystems and to raise public awareness on the linkages between environment and development. There is also the Environmental Protection Act of 2000<sup>1</sup> which establishes the Department of the Environment. The Act addresses administrative matters and the institutional machinery to handle environmental issues. The environmental department within the Ministry of Lands,

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<sup>1</sup> National Environmental Protection Act, 2000

Housing and the Environment, is responsible for the promotion of goals and strategies, monitoring, setting of standards, education and training, coordination of national policies and the provision of environmental data and information. The Act specifies requirements for the EIA of waste disposal and the exploitation of hydraulic resources. Also specific provisions are made for consultation of the affected communities and public participation before project approval. There is also the Forestry Act of 1988 which provides guidelines for the clearing of natural vegetation. The Factories Act of 1974 relates to health and safety issues and waste disposal issues. Further, Sierra Leone is a signatory to several international agreements that have direct and indirect energy implications. These include The Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC).

The energy sector has bigger local, regional and global environmental impacts than most other economic sectors and energy policies should aim at reducing these impacts while promoting the supply of cleaner energy services and increasing energy conservation. The local impacts include contribution to land degradation in peri-urban areas and mountainous regions in the Western Area that have been affected by firewood collection and indoor pollution of firewood and charcoal users and pollution of the air by transport fuel emissions as the country still uses leaded fuel and other additives.

### 1.3.2 Linkages with other sectors

The energy policy should recognize that there are linkages between the energy sector and the other sectors of the economy. In particular, policies on the economy, environment, water resources, agriculture, forestry, industry, health, transport, education and decentralization should be taken into consideration.

An efficient institutional arrangement is a prerequisite for the proper functioning of the energy sector. There should be a clear division of roles and responsibilities. Government's role should be mainly to provide effective regulation, monitoring and coordination of the sector. The government must also vigorously support private sector initiatives. It will also be absolutely necessary to determine, by legislation, the roles and relations of the different players including the ministry, regulators and operators of the sector.

### 1.3.3 International and regional linkages

An energy policy must be compatible with global and regional energy policies. Local policy developments must acknowledge international and regional energy trends, especially in areas of energy investment, pricing and global impacts. On



an international perspective the Government is a signatory to several international conventions on climate change, land degradation and environmental issues.

At the global level, the energy policy should be in accordance with the UN Millennium Declaration which sets the Millennium Development Goals (MDGs) for reducing extreme poverty by 2015 and the Johannesburg Plan of Implementation (JPOI) adopted at the World Summit on Sustainable Development (WSSD) in September 2002.

At the regional level, the New Partnership for Africa's Development (NEPAD) offers an immense opportunity to integrate Africa's energy to enhance energy trade, thus optimizing the development and use of resources and providing cost-effective energy services.

At the subregional level, the West African Power Pool (WAPP) and the West African Gas Pipeline (WAGP) project also offer considerable opportunities for interconnections and inter country trade in energy. Within the West African sub region, Sierra Leone is a member of ECOWAS, which is promoting regional energy cooperation and integration.

The proposed energy policy must, therefore, address energy issues that are in consonance with aspirations of NEPAD and ECOWAS aimed at attracting private sector investments, development of interconnections, cross-border infrastructure to facilitate energy trade and sharing of information on petroleum resources and exploration and the development and use of renewable energy resources.

The traditional role played by global financial markets is changing. The World Bank and other multi-lateral lending agencies which have hitherto been very active in financing the energy sectors of developing countries are now increasingly stressing the need for private sector participation. Private finance is now very important and the structure of energy markets and energy investments is reflecting this fact. Government now faces the challenge of creating a policy framework with appropriate legal, fiscal and regulatory regimes to attract domestic and international investment, while ensuring that national policy objectives are achieved.

#### 1.3.4 Approach to the policy formulation

The approach to policy formulation for the energy sector in Sierra Leone is similar to that of many other sectors. This approach consists of the following:

- Recognising the problems
- Identifying the underlying causes

- Identifying potential solutions, analysing their implications and making choices
- Monitoring and evaluating the effects of the implementation of the policies when these commence.

The general approach to policy formulation has changed in Sierra Leone. Greater emphasis is now placed on transparency, inclusiveness and accountability. The energy policy process has therefore attempted to achieve the following:

- To make the approach to energy policy formulation transparent
- To build public confidence in the policy formulation process
- To clarify accountability and organisational roles through the process of policy formulation
- To communicate policy in a manner which is clear and understandable to all
- To integrate various government policy processes.

Stakeholders have contributed immensely to the identification of key issues/ challenges, including validation of assumptions made and policy options proposed. At the inception of the policy formulation process, policy papers were prepared on specific energy issues, based on an assessment of existing institutional framework and energy demand and supply patterns. These served as discussion documents at the first stakeholders' consultative meeting. The main goals, objectives, and strategies making up the national energy policy as well as an action plan were also derived through a consultation process with stakeholders at a second stakeholders' meeting held after the release of the draft policy document.

The analysis of the energy sector starts with the identification of different demand and supply sub-sectors. Several cross cutting issues have a bearing on the energy sector. It is also necessary for the policy document to address these issues.

## Chapter 2. The Energy Sector in Sierra Leone

### 2.1 Overview of the energy sector

The Ministry of Energy and Power (MEP) is the custodian of the electricity and water Sectors. The MEP is responsible for sector policy and coordination. The wider Energy Sector in Sierra Leone is, however, within the purview of various Ministries. The MEP handles matters related to electric power supply, including that from hydroelectric schemes and, nominally, renewable energy matters related to solar and wind energy. The Ministry of Agriculture, Forestry and Food Security (MAFFS) handles biomass issues (plant- and animal-derived matter), especially fuel wood. Petroleum marketing and sales are handled by the Ministry of Trade and Industry (MTI). The Ministry of Finance (MF) also plays a significant role in the import and storage of petroleum products. Petroleum exploration and extraction is now within the purview of a Presidential Petroleum Commission. The Ministry of Mineral Resources (MMR) deals with extraction of minerals, including energy related minerals. There are grey areas relating to the marketing and sales of several energy related products.

Sierra Leone is reasonably well endowed with energy resources, particularly biomass energy (forestry), hydroelectricity and other renewable energy sources (e.g. solar energy). There is an extensive network of rivers and tributaries that provide a large hydroelectric power potential conservatively estimated at 1,200 MW. Technically and economically, the most promising site is at Bumbuna on the Seli River, whose development started with a 50 MW installed capacity (first stage), and an ultimate installed capacity of about 300 MW. These resources can play a catalytic role in sustaining Sierra Leone's development.

Currently, the country faces difficulties with commercial energy supplies, particularly electricity supply. Freetown is supplied with electricity from the oil-fired King Tom generating station, while most areas in the interior, except for Bo and Kenema, are wholly or largely without power supplies. Freetown is still facing extremely intermittent power supply pending completion of the long-delayed Bumbuna hydroelectric project. Sierra Leone imports all of its petroleum fuels requirements, and a dearth of foreign exchange, and heavy debts to oil companies, frequently led to fuel shortages in the past.

The institutional framework that was in place in the mid-1980s has not changed significantly. Most of the institutional deficiencies, which represented a major obstacle to the efficient and reliable supply of commercial energy, particularly with regard to the absence of a single ministry for formulating and coordinating energy sector policy, have not yet been addressed. The Ministry of Energy and Power is still in

theory responsible for coordinating all energy activities; but, in practice, it has neither the technical capacity nor the mandate to formulate projects/programmes and plan investments in the development of the energy sector.

The present electricity situation in Sierra Leone is worrisome. The available generation capacity is grossly inadequate and load shedding is constantly in force. The present demand in the Western Area, including the capital city Freetown, is estimated to be 40 MW, while available capacity is limited to about 28 MW. NPA's commercial operations are characterized by a high share of domestic consumers and high technical and non-technical losses accounting for about 31% and 37% of the energy produced respectively in 2002. In addition to the above losses, there is also the financial loss as a result of non-payment of bills by NPA's customers.

The country depends on imported petroleum products to satisfy most of its modern energy needs especially for electricity production and the transport sector. This feature has led to serious difficulties for the country as energy imports amount to 26% of the total imports. A special Unit has been created with assistance from the World Bank to keep track of procurement of petroleum products. The Unit involves the Ministry of Trade and Industry and the Ministry of Finance in its work.

Promoting the development and utilization of renewable energy sources (solar, wind, small hydro, etc.) has not been a priority in the programme of the Ministry of Energy and Power. Another feature of the energy economy is the heavy reliance on traditional fuels- firewood and charcoal in the domestic sector to satisfy cooking needs for over 80% of the population. The traditional fuels (fuelwood and charcoal) sub-sector is not under the supervision of the Ministry of Energy and Power, but falls within the jurisdiction of the Ministry of Agriculture and Forestry. The afforestation programme in this ministry has been focusing on energy conservation with the promotion of improved firewood stoves and tree planting. Cutting trees for survival purposes has thus led to shortages in supply of fuelwood in some cities.

Presently, there are hardly any comprehensive and coordinating mechanism between the various ministries dealing with energy. There is no central institution capable of assessing potential energy resources, making projections of energy demand and supply and designing an energy development and investment plan to meet overall economic objectives.

## 2.2 Institutional framework

### **Electric power sector**

The Ministry of Energy and Power has responsibility for the entire electricity sector, covering the harnessing of the country's considerable hydropower potential, the most

notable of which is the Bumbuna Hydroelectric Project (BHEP), and matters related to alternative energy sources. The Project Implementation Unit (PIU) for the BHEP reports to the Ministry of Energy and Power.

The National Power Authority (NPA) set up by the NPA Act of 1982 is responsible for the management, production and distribution of electricity in the country. It is a vertically integrated monopoly supplier of electricity in the Western Area, where the capital, Freetown, is situated. The NPA is further responsible for the operation of electricity supply in the provinces.

The Bo-Kenema Power Services (BKPS) is a semi-autonomous division of NPA responsible for the integrated supply of electricity to the townships of Bo and Kenema and their environs.

Oversight of NPA currently rests with the National Commission for Privatization (NCP) pending its eventual privatization.

### **Petroleum sector**

The country has a petroleum refinery, the Sierra Leone Petroleum Refinery Corporation, that has an annual distillation capacity of 700,000 metric tons but it has stopped operations and was sold in 1994. The marketing and sales sector of the petroleum products is dominated by five petroleum companies, namely Mobil, National Petroleum Company (NP), Safecon, Unipetrol and Leonoil. Petroleum exploration and extraction is within the purview of a Presidential Petroleum Commission, while petroleum marketing and sales are handled by the Ministry of Trade and Industry (MTI).

The Petroleum Unit (PU), supervised by the Ministry of Trade and Industry (MTI) in close collaboration with the Ministry of Finance (MF) largely regulates activities in the sector. The PU has been given a new mandate to serve as industry regulator/coordinator and the relevant legislation is being drafted.

There is a Fuel Unit within the Ministry of Trade and Industry that has mainly a monitoring function. A Standards Bureau within the MTI plays a key role in calibrations and measurements in the petroleum industry.

### **Fuelwood/Charcoal sector**

At present, there is little or no formal management structure for the supply and distribution of fuelwood (firewood and charcoal) in the country. The Ministry of Agriculture, Forestry and Food Security (MAFFS) supervises activities in government protected forest areas. However, their task is very difficult because of poor support

services and lack of adequate manpower. Further, the increasing pressure from fuelwood users as the number increases only worsens the Ministry's problems.

The downstream operation of firewood and charcoal is coordinated by the Wood Sellers Associations and Charcoal Sellers Associations that are loosely linked with various Ministries and Agencies. The operations are poorly regulated or not regulated at all. The sector is governed by the Forestry Act, 1988 and the Forestry Regulations, 1989.

### **Regulation of the energy sector**

Regulation in the energy sector is very weak, especially in the traditional fuel sector. Electricity tariffs are endorsed by the Ministry of Energy and Power, but the final approval is by the Cabinet. As all private generating sets over a specified size have to be licensed through NPA by law, some regulation of these sets are done by NPA. Petroleum products are regulated as discussed above.

## **2.3 Energy resources of Sierra Leone**

Sierra Leone is yet to have an energy source map and so isolated studies from government institutions, the university and international agencies form the basis of the information on the energy sources of the country. The energy sources of the country can be classified into fossil and renewable energy resources.

### **2.3.1 Fossil fuels (Hydrocarbons)**

The fossil fuels with commercial value in Sierra Leone are lignite and crude oil. While lignite is fairly well quantified, the official estimates of crude oil is not available.

#### **Lignite resources**

In 1944, the Geological Department of the Sierra Leone Government identified lignite deposits at Yema, 42 km from the capital, Freetown. Later studies have identified other areas which include Songo, Masanke and Kenema. Though the exact figures are unknown, reserves are estimated between 700,000 and 1,000,000 tonnes<sup>2</sup>. However, there are significant clay deposits within the lignite deposits, and this can increase the excavation costs.

#### **Petroleum resources**

The government has, since 1979, entered into several agreements with oil exploration companies searching for crude oil along its the south west part of the country. The petroleum exploration and production sector is regulated by the Petroleum Exploration and Protection Act, 2001 which makes provision for the establishment of

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2 UNDP, 1980

the Petroleum Resources Unit, under the authority of the President and headed by a Director-General. As a result of a bidding process which closed in May 2003, three companies were awarded concessions for four of the seven identified blocks. The agreement with these companies provides for the exploration and development work in the contract areas or blocks.

### 2.3.2 Renewable energy resources

Hydropower resources, biomass and solar energy are the three exploitable renewable energy sources in the country. Wind speeds are generally low, averaging about 2-5 m/s and so its potential as an energy source is very limited. However, there are few scattered places that have sudden gust of high wind speeds which can be attractive<sup>3</sup>. The Power Sector Master Plan study<sup>4</sup> estimated the mean velocity at 10 m above ground level to be 3-5 ms<sup>-1</sup>. Assuming an average wind velocity of 5 m/s, the electricity generation costs was estimated at 8-10 US\$/kWh (without grid connection).

#### **Hydropower potential**

The country has several rivers that could be exploited for hydroelectricity, but only two have been exploited and a major one is being constructed. There is no comprehensive hydro source map of the country, but over 21 sites have been identified as capable for producing potential power exceeding 1150 MW. Table 1 gives a selection of those sites. However, seasonal variations which can reduce the potential by 50% and lack of capital have slowed down the exploitation of these sources.

In the Power Sector Master Plan Study carried out in 1996, a number of very promising sites were identified. Up to 1200 MW of electricity could be provided from hydroelectricity in the country. Of the twenty four additional hydro sites were identified during study, only four of these could provide hydropower at low cost with annual flow regulation.

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3 Davidson O.R. Energy decisions in Developing countries: A case study of Sierra Leone. June 1988. IDRC MR192. Ottawa, Canada.

4 Lahmeyer International. February 1996. Power Sector Master Plan-Main Report.

**Table 1: Hydro-electric Sites in Sierra Leone**

Site	Location	Type of System	Installed Capacity MW	Cost per KW Installed US\$/KW
Bumbuna Phase 1 Phase 2 Phase 3A Phase 3B Phase 4	Magburaka	Storage	305 (53.4) (80) (125) (185) (305)	1840
Gbangbaia	Moyamba	Run of river	1.0	3410
Gandorhun	Bo	Run of river	20	3270
Mawalako	Kabala	Run of river	0.5	6420
Benkongor	Kono		10.8	2040
Betmai	Magburuka	Run of river	3.6	3750
Singimi	Moyamba	Storage	7.2	3890
Kambatimbo	Koinadugu	Diversion	0.8	8250

Source: CESI/CANREDE Ltd, SNC, Bumbuna Studies

### **Biomass resources**

Biomass is the major renewable energy used in Sierra Leone's households for cooking. It has great prospects if used properly. The forest and by-products from the farming system have provided the main source of fuelwood used. Unfortunately, the rate of depletion exceeds the replenishment rate and recently the use has intensified due to many factors such as increased poverty and scarcity of alternatives. There are significant agricultural and crop residues available estimated to be up to 2 million tonnes of oil equivalent. These include animal waste, rice straws, sawdust, cocoa pods, etc.<sup>5</sup> The use of these wastes is limited.

### **Solar energy**

Solar energy is in abundance because of the location of the country, but a detailed radiation data for all parts of the country is needed as such information is needed. A study which evaluated radiation data for selected parts of the country using mean monthly temperatures and other climatic data to estimate radiation intensity showed that an average of monthly solar radiation of 400 cal/sq.m/day is possible<sup>6</sup>. A more recent study estimated the average solar radiation at 1460 to 1800 kWh/ (m2/y) and photovoltaic (PV) electricity generation costs at at 65-85 US\$/kWh which is extremely high<sup>7</sup>.

5 Massaquoi, J.G.M. Biomass Resource Assessment: A survey of Sierra Leone's Energy potential from Agricultural and Forestry wastes.

6 Sherriff A.Y. Prediction of solar radiation in Sierra Leone. B.Eng Report-Mech Eng. University of Sierra Leone.

7 Lahmeyer International. February 1996. Power Sector Master Plan-Main Report.



## 2.4 Energy Supply and Demand

### 2.4.1 Energy Supply

#### 2.4.1.1 Electricity Sub sector

Electricity in Sierra Leone is largely produced using petroleum products and its distribution is limited. Only two hydro power plants of 2.5 and 4 MW have been in use with a third of 58 MW to be operated soon. The inability by the national utility to meet the current rising demand has led to widespread use of private generating sets in industrial, commercial and household sectors causing serious economic problems as nearly all use imported petroleum products. The energy production is discussed separately from the energy use.

Sierra Leone's electricity production has been characterized by specific features, namely poor investments in generation resulting in very low generating capacity, rising high transmission and distribution losses and restricted distribution systems in major towns. Prior to the civil conflict in 1985, the country had a total generating capacity of 137.4 MW, of which 58.2 MW was in the Western area and 16.0 MW in the provinces run by the National utility. NPA and private generation generated 63.2 MW and the mining sector 38.2 MW. All these plants were using petroleum products. In 1991, available generating capacity was about 120 MW of which 116 MW was for thermal power plants, and 4MW was from the hydro plant at Dodo in the Kenema District. Of the total installed capacity, NPA operated 33.4 MW in the Western Area, and 14.5 MW in isolated provincial towns. There were some 28 MW of captive capacity in the mining sector, and 40MW of estimated capacity of auto-generators. These are summarized in Table 2 below.

**Table 2: Generating Capacity in Sierra Leone in 1985 and 1991**

Parameter	Year	National Power Authority (NPA)			Private Generation		
		Western Area	Provinces	Total	Mines	Others	Total
Installed Capacity (MW)	1985	58.2	16.0	74.2	38.2	25.0	63.2
	1991	33.4	14.5	47.9	28	40.0	68.0

Source: National Power Authority

The captive capacity in the mines and the installed capacity in the provincial towns, were all virtually wiped out during the 11-year conflict. In the Western area, the substantial investment in the sector since 1991 has largely been on other areas than increasing generating capacity, and the generating situation continues to be desperate.

Rural electricity supply has largely been ignored. Despite the infusion of a considerable amount of capital to improve the electricity situation, both from government direct input and external loans from the World Bank and other sources, NPA's underlying problems still exist.

### **NPA's Operation in the Western Area**

The electricity supply and service in the Western area is poor. The installed capacity is totally inadequate and frequent breakdowns lead to frequent load shedding. Current improvements funded by the EU will only increase network capacity to about 31 MW. Network efficiency is also low. The electricity tariff is one of the highest in the sub region, even though it does not include provision for capital cost recovery. High technical and commercial losses combined with poor revenue collection are the major contributors to the liquidity problems of the utility.

Historically, electricity supply in the Western Area has been from three stations, Kingtom the main station, Falconbridge a standby station and Blackhall Road which is an old station and not operating at present. The installed capacity at the effective operating station at Kingtom is 33.6 MW of which about 30 MW is available for production. As previously mentioned, these machines are experiencing frequent breakdowns and they produce below expected performance. As an example, the machines that are expected to produce 18 kWh per gallon are producing between 15-16 kWh per gallon. The breakdown of Kingtom is given in Table 3.

**Table 3: Generating capacity at Kingtom Power Station**

Machine	Date Commissioned	Fuel Used	Installed Capacity (MW)	Available* Capacity (2002) (MW)	Load
Sulzer 4	1978	HFO	9.2	8.2	Base
Mitsubishi 6	1995	HFO	5.0	4.6	Base
Sulzer 5	1978	HFO	9.2	7.7	Base
Mirrlees	2001	HFO	6.3	6.0	Base
Caterpillars	2000	Diesel	3 x 1.3	3.2	Peak
			33.6	29.9	

Note \* Data taken on last week November 2002

### **Provincial Stations**

These are a range of island generation and local distribution networks outside the NPA (Western Area) including BKPS discussed below. Most of the provincial stations are now in a state of total disrepair. The cost required to get the stations and services

back to their pre-1994 levels is estimated at Euro 13 million. The total number of consumers in all of these provincial stations in 1994 was estimated at about 4500.

### **Bo-Kenema Power Services (BKPS)**

The BKPS is entrusted with the zonal responsibility for the generation, transmission, distribution and sale of electricity to Bo, Kenema and their environs. The BKPS has a mixed hydro-thermal operation. The thermal power station at Bo has an installed capacity of 5MW and the hydropower station at Dodo, 4 MW. The hydro station mainly operates during the rainy season and the thermal station during the dry season. The BKPS operates a 33kV sub-transmission line with 11kV and low voltage local distribution. There is need to expand and upgrade the distribution network because of growing demand. The thermal generators in Bo using fuel oil are in a bad state and need to be overhauled. Most of the consumers are domestic consumers. BKPS faces the same problems with its commercial operations as NPA.

### **Bumbuna Hydroelectric Project**

The Bumbuna hydroelectric project is now about 85% complete. The project has the potential to make a substantial positive impact on the national electricity supply. The associated transmission infrastructure will provide the link for priority provincial areas and eventually become the backbone of a national grid. The Bumbuna project could provide about 55MW at the peak of the rainy season and about 25MW during the dry season. Subsequent stages of the project could result in electricity generated of up to 300 MW. A recent donor conference resulted in additional pledges for the completion of the first phase of the Bumbuna project.

The current and immediate generating capacity is summarized in Table 4 below.

**Table 4: Current and immediate generating capacity in Sierra Leone**

<b>Location</b>	<b>Thermal (MW)</b>	<b>Hydro (MW)</b>
Freetown	33.6	-
BKPS	5.0	4.0
Provinces*	11.0	-
Bumbuna **	-	58.0
<b>Total</b>	<b>49.6</b>	<b>62.0</b>

Source: National Power Authority

Note \* Availability almost negligible

\*\* Operational in 2006

### 2.4.1.2 Petroleum sub sector

Since the closure of petroleum refining operations in Sierra Leone, the country has been importing all its petroleum products to satisfy its needs. The country imports about 200,000 metric tons annually but this figure declined significantly during the war. Table 5 gives the imported fuel (petrol and diesel) between 1992 and 2003.

**Table 5: Imported Petroleum Products (petrol & diesel) into Sierra Leone-1992 to 2003**

Year	Petrol (MT)	Diesel (MT)
1992	20,022	24,101
1993	42,636	53,893
1994	36,475	47,826
1995	43,374	23,322
1996	31,203	14,506
1997	12,478	6,112
1998	19,903	18,929
1999	15,747	12,377
2000	29,874	39,561
2001	31,240	35,552
2002	36,524	49,462
2003	47,500	59,252

Source: Petroleum Unit MTI

The petroleum products are imported mainly from Abidjan in Ivory Coast and experiences some supply difficulties mainly due to unavailability of products at the SIR refinery in Abidjan and bottlenecks in allocation or chartering of vessels and maintenance to vessels. The procedures for procurement and delivery of oil products often result in long delays and unreliable supplies. There are also shipping and storage limitations. However, past problems of fuel supply have been considerably reduced and demand is now mostly met. Due to distribution and other problems, scarcity is experienced in the rural areas where the people generally pay more for all classes of petroleum products because of added transportation costs.

#### **Pricing Issues**

Prices are fixed according to an agreed formula which takes into consideration the Platt price for petroleum products, and the exchange rate. Allowances are made for various levies and a distribution cost to arrive at the pump price. Prices also differ in various parts of the country.

### **Government Revenue Issues**

The industry contributes as much as Le 46 billion (about \$US 17 million) annually to government revenue in terms of Excise Tax and Road Users Tax.

### **Procurement and Marketing Issues**

The downstream petroleum sector in Sierra Leone has relatively satisfactory product supply and distribution programmes. However, a lot remains to be done in terms of combating typical oil industry malpractices of product adulteration and fraudulent/illegal practices. The industry is faced with a number of problems. Storage capacity is limited, thus oil companies cannot import huge quantities of product at any one given time. The unavailability of foreign exchange to pay for products is perhaps the biggest constraint facing oil companies in Sierra Leone.

### **Strategic storage issue**

The Ministry of Trade and Industry is considering setting up Strategic Reserves for Petroleum Products, but the cost seems prohibitive based on the country's economic situation.

## **2.4.1.3 Fuelwood and other renewable sources of energy**

### **Fuelwood and charcoal**

Biomass (firewood and charcoal) constitutes over 80% of total primary energy consumption in the country. Fuel wood supplies in Sierra Leone are obtained mainly from closed high forests, Savannah wood lands and mangroves. Firewood is normally harvested as an integral part of land clearing for farming, taking care of the energy needs of farming families in the rural areas. Fuel wood can also be a by-product of forest management e.g. thinnings from silvicultural treatment and wood wastes from logging and sawmilling. The major areas of production for the urban market include farming areas adjacent to motorable roads or those areas accessible by waterway. These areas have become heavily exploited.

The main charcoal producing forests are in the Freetown Peninsular Reserves, the mountain village forests and sections of the mangrove forests. As much as 30% of the wood produced is converted to charcoal. The most widely used production method is the earth pit, which is inefficient but inexpensive. In terms of volume, charcoal forms only about 10% of wood resources used for energy production.

The distribution of firewood and charcoal to meet urban requirements is monetized and commercial, while distribution in rural areas rarely involves monetary transactions. Transportation cost is a major element of the costing for supply of fuel wood to urban areas. Prices of fuel wood vary considerably from town to town and from one province to the next.

### **Improved stoves programmes**

The Forestry Division and some environmental NGOs have recently been making some efforts to promote the use of improved stoves in the country. There have however been no independent tests done to assess the relative efficiency of these stoves. Stove use is not pervasive.

## **2.4.2 Energy Demand**

Sierra Leone's energy use is characterized by the dominance of fuelwood use in the domestic sector (largely for cooking) and low access to electricity. Fuelwood use represents over 80% of primary energy consumption in the domestic sector. Less than 10% of the population have access to electricity and most of these live in the Western Area around the capital, Freetown.

Energy use in Sierra Leone can best be seen within the various energy consuming sectors, namely households and institutions, industry and commerce, mining, transport and agriculture. However, the importance of electricity in the modern economy needs special attention as it is used by all the different economic sectors.

### **2.4.2.1 Households and Institutions**

There are significant differences in energy use between rural, peri-urban and urban dwellers. Poverty levels are considerably higher in the rural areas. A recent survey carried out in Sierra Leone revealed that about 70% of Sierra Leoneans live below the poverty line (Sierra Leone Integrated Household Survey-Consumption aggregates and Poverty Estimates). Fuelwood accounts for 92 % of the household primary energy consumption and is used mainly for cooking, especially in poorer households. Access to electricity is very low and is restricted to urban areas, being nearly non-existent in rural areas. The same survey yields the following results which clearly illustrate the energy use patterns of the poor and non-poor as summarized in Table 6 below.

**Table 6: Energy use patterns of the poor and non poor**

<b>Activity/facility</b>	<b>% of poor utilizing facility</b>	<b>% of non poor utilizing facility</b>
Kerosene	89	69
Cooking with fuelwood	99	78
Charcoal	1	15
Electricity	2	29

Source: Sierra Leone Integrated Household Survey – Consumption Aggregate and Poverty Estimates, Statistics Sierra Leone

Institutions in urban areas mainly use electricity. They however face the same problems as households related to supply difficulties and poor quality of electricity. There is frequent load shedding and use of auto-generation is prevalent. Institutions in urban areas are badly affected by lack of electricity. This has an adverse effect on the quality of various services provided-health services, water supply etc.

A household survey done in 1986 indicated that 1% use LPG as a cooking fuel. The petroleum product used in the household is mainly kerosene. Fuel wood is mainly used for cooking and ironing and hardly ever used for lighting purposes.

There is need to shift from the over-dependence on traditional biomass energy for cooking to alternative fuels like LPG. Unfortunately, even though many African countries have now embarked on this strategy, there has been no concerted effort by government to pursue policies to make the use of fuels like LPG pervasive. Presently, only two of the five petroleum sales and marketing companies are involved in marketing LPG and they operate mostly in the urban areas within the country. In general, petroleum companies have not made any conscious effort to address the problems in making LPG use more pervasive.

#### **2.4.2.2 Industry and Commerce**

In Sierra Leone, small-scale industrial developments rely on power. Large industrial establishments as those in the Wellington industrial area of Freetown have been badly affected by shortage of power resulting in serious economic problems. Power shortages do not only disrupt current productive activities but also threaten future industrial and commercial investments. The commercial sector that includes wholesale and retail shops, hotels, restaurants and recreation centres are also affected by electricity supply disruptions. Overall, the demand for energy in the industrial and commercial sectors is mainly met by auto-generation and this has negative economic consequences because they depend on petroleum products. Studies have indicated that auto generation is considered more expensive than grid electricity. Furthermore, most industries in Sierra Leone use electricity inefficiently.

The quality of electricity to industrial and commercial centers is generally unreliable. Poor housekeeping and a dominance of old energy-efficient technologies and lack of replacement parts do not help the situation. Some customers are disconnected for 12 hours and occasionally up to 18 hours per day. Commercial and industrial clients are prioritized by day and residential consumers by night. There is a high degree of suppressed demand and NPA is a long way from meeting the increasing demand of industrial and commercial consumers.

The industrial sector is small in Sierra Leone and there has been very little investment in new industries. Efficiency of energy usage is low in most factories. This is due to a combination of factors including operating below rated capacity and the use of old inefficient technologies. Efficiency in small industries (tobacco curing, fish smoking, tile making etc.) is low compared to other countries.

Although NPA carries out cursory energy audits for large industries and commercial enterprises, this is not done in a concerted fashion and there are no awareness-raising programmes. Table 7 shows that the industrial share of grid electricity is very small, being only a fifth of the total energy consumed.

**Table 7: Electricity generated between 1998 and 2002**

	1998	1999	2000	2001	2002
Electricity Generated (GWh)	82.3	62.14	69.18	106.32	114.26
Industrial Share (%)	16.3	10.9	26.6	20.7	21.1

Source: National Power Authority

### 2.4.2.3 Mining

Sierra Leone's mining sector can be divided into the small scale and artisanal sector and the large-scale sector. Power requirements are small in the small scale and artisanal sector, and this sector depends on small petrol or diesel generators for power, often buying fuel at exorbitant prices. The large-scale mining companies normally operate in remote environments and have to be self sufficient in the provision of infrastructural facilities including power. All of the major mining companies generate, transmit and distribute their own power using thermal power stations. Power costs are usually a considerable portion of operating costs. The mining companies have traditionally used more power than a lot of the larger provincial towns. Sierra Rutile as an example had an installed capacity of 16.8 MW before the mine shutdown and it is envisaged that capacity will double when they start up again. Many logistical problems usually need to be overcome in the provision of power, a major problem being the procurement and transportation of fuel. Until a national grid is developed and major urban areas have considerably increased access to electricity, auto generation will be a feature of the large-scale mining industry. None of these companies supply power to outlying areas.

### 2.4.2.4 Transport

Sierra Leone is almost entirely dependent on imports for key agricultural inputs, industrial inputs, machinery and equipment, spare parts and fuels for all its sectors,



including agriculture, mining, manufacturing, and construction. Most of these imports are handled by the Freetown Port and then dispatched to the final destination predominantly by road. Some high value pharmaceuticals, spare parts and equipment are handled by Lungi International Airport. Transport cost accounts for a large portion of the cost of production of most establishments in Sierra Leone.

River transportation is a common feature for coastal communities using ferries and small boats (Panpans). The road transportation system is dominated by small cars, taxis and minivans. There is no mass transit system. Inefficiencies in the transportation systems, high fuel costs, poor regulation and road congestion in urban areas are contributing to high transportation costs for the public. The poor state of the roads exacerbates several problems in rural areas.

The transport sector consumes over half of the total quantity of petroleum products but the sector needs to address issues of energy efficiency more seriously. The state of the roads, the lack of a mass transport system and the mechanical condition of the vehicles affect the transport sector. Gaseous emissions from vehicles also constitute a significant portion of pollutants in towns and greenhouse gas emissions.

The public uses mainly taxis and minivans for transportation, many of which are second hand vehicles. The number of vehicles imported after the end of the civil war has increased tremendously.

#### **2.4.2.5 Agriculture**

Preliminary data from Statistics Sierra Leone's current Integrated Household Survey (April 2003 – March 2004) covering a 6-month data collection period (or a sample size of 1945 households) indicate that 30 % of the working population of the country is engaged in farming in urban Sierra Leone while 66 % are engaged in farming in rural Sierra Leone. The bulk of the farming is on a subsistence scale utilizing non-mechanized implements.

It is well known that using energy for enabling the mechanization of irrigation and the entire agricultural process, including irrigation, can lead to increases in farm income through enhanced productivity. Mechanization of water pumping from ground sources or storage reservoirs, for example, can ensure the timeliness of planting, harvesting, post harvest processing, and transportation.

The economy of Sierra Leone is dependent on agriculture, which employs over 75% of the workforce. Subsistence farming is the most common activity and women are the main stakeholders in most agricultural activities. Drying and processing of agricultural products is by traditional applications of solar energy and firewood. Many

agricultural activities contribute towards deforestation, through extensive farming and slash-and-burn practices.

The government is committed to its food security programme and ensuring that this is achieved by 2007. This will undoubtedly involve increasing the level of mechanization in farming. Food preservation measures and transportation that are integral features of the agricultural system would involve increased use of fuel. The current Agricultural Policy calls for increased output and efficiency in agricultural production, timely delivery and efficient use of energy inputs into agriculture and increased use of tractors.

Agriculture accounts for 44.1 % of Sierra Leone's GDP but fuel consumption in this sector is negligible because of the largely non-mechanical nature of the sector. The energy consumption in agriculture is not usually accounted for in the national energy balance of Sierra Leone. There are very few agro-based industries. The amount of diesel used in farms is almost negligible.

## **Part II: Policy Objectives and Challenges of the Energy Sector**

### **Chapter 3. Policy Objectives and Challenges of the Energy Sector**

#### **3.1 Vision**

The vision of the energy sector of Sierra Leone is to ensure that high quality modern energy services are accessible, affordable and available throughout the country, while minimizing negative environmental impacts .

#### **3.2 Main policy goals and targets**

The main policy goal of the Sierra Leone energy sector is therefore:

To provide adequate modern energy for every citizen within the supporting enabling environment for the efficient management of Sierra Leone's energy resources and use while ensuring energy security in an environmentally benign manner for sustainable development.

The goals of the various sub sectors as outlined in the stakeholders' meeting are:

1. To provide on a sustainable basis, adequate modern energy supplies to meet the development aspirations of the country.
2. To provide electricity at affordable prices everywhere in the country.
3. To ensure uninterrupted supply of petroleum products throughout the country at affordable prices.
4. To provide environmentally friendly, affordable household energy on a sustained basis.
5. To develop indigenous fossil and renewable energy sources for the country, especially to utilize such sources for the country to meet its MDGs by 2015

The main policy targets include:

- Increase access to electricity services to 35% of the population of Sierra Leone by 2015

- Ensure adequate supply of petroleum products to all towns of more than 10,000 inhabitants by 2010.in the country
- Increase the access to high quality household energy substantially by 2015

### 3.3 The Challenges of the Energy Sector

#### 3.3.1 Broad challenges

Sierra Leone is facing major challenges in meeting with its development aspirations and one of the main factor for this situation is that the energy sector is very weak. Access to electricity is largely limited to the main towns, and access to transport fuels is also limited. Ensuring the provision of these energy services nationwide at an affordable price is an uphill task because of major financial, technical and institutional challenges. Despite the fact that the country has significant energy resources, financial, technical and environmental challenges have restricted the pace at which these resources have been developed. Overcoming these challenges is of major concern.

In addition to these energy supply challenges, there are major other challenges which need to be addressed in order to improve the effectiveness of the energy sector. These vary from management issues relating to conversion and use to that of the overall efficiency of sector. The major ones can be summarized as follows:

- Lack of coordination of the various energy sub sectors and consolidation of some functions, resulting in poor linkages with related sectors.
- Inadequate coordination and information sharing among the various projects, government institutions and the private sector.
- Inadequate energy information system including accurate data on energy supply and demand as well as the country's resource potential.
- Inefficient production, supply and use of energy
- Budgetary and financing constraints.
- Lack of appropriate mechanism to ensure the supply and use of modern and efficient energy services to the rural population.

Besides the above broad major challenges, there are a number of key issues and challenges identified at the sectoral level. These are discussed by energy sub-sectors: the electricity/power sub-sector, the petroleum sub-sector and the renewable energies sub-sector, including fuelwood and charcoal.

### 3.3.2 Sub-sectoral challenges

#### 3.3.2.1 Electricity/Power sub-sector

The power sector has undergone a series of initiatives mainly through different management contracts in a bid to improve the overall performance of the power sector, but NPA, the national utility is yet to demonstrate improved performance. Fuel cost continues to be the single highest expenditure item in its operation, constituting about 65% of NPA's operational costs. Secondly, the age of the machines is a major problem as they have to undergo regular maintenance cycles to keep them running with attendant costs and outages (either planned or unplanned) resulting in reduced services to customers. This feature has led to frustration by the customers and lack of confidence in NPA's capacity to supply reliable power. As a result, official power generation is substituted by private auto generation. Auto generation in the Western area alone is estimated to be about 40MW, far above the capacity of the Kingtom Power Station which is 33.4 MW. The cost of auto generation is by far higher than the tariff levied by NPA especially for low capacity machines. The cost levels out and is even better than the NPA tariff after about 300kVA as can be seen from Table 8

**Table 8: Estimated cost for auto generation (modified to reflect current fuel costs)**

KVA	5.0	12.5	25.0	50.0	100	300	750
Total cost/kWh (US¢)	67	46	32	22	19	15	14

Source: Power Sector Master Plan Study 1996

This, therefore suggests that people owning generators would prefer supply from NPA if only they can provide reliable service..

Capacity expansion to meet demand has been rather piece-meal and has not coped with the growing demand. As a result, the amount of suppressed demand continues to increase because of the failure of the national system to supply adequate and reliable electricity.

Another cause of serious concern at NPA is the high transmission losses. Estimates of losses (both technical -20% and non-technical-15%) incurred in distribution of power in Freetown, the capital city amount to 35 %, a rather unacceptably high value, especially with considered with the low efficiency of generation.

The absence of a national grid, the limitations in sub provincial plans and extremely high system losses are serious drawbacks to improving electricity access. The government's commitment to develop and expand its hydro resources including the other phases of

Bumbuna, will create an enabling environment for private participation such as using IPPs .

Other key issues are the high tariffs when compared to other African countries. Electricity theft is also a major problem in the sub-sector..

### **Completion of Bumbuna hydroelectric project**

The Bumbuna Hydroelectric Project (BHEP) which has been on-going for a long time now is being re-activated and the country hopes to complete the first phase by end of 2006 if the government succeeds in completing transactions regarding funding of the remaining work with development partners involved in the project. The expected capacity of the first phase during the rainy season is 50 MW, and about 25 MW during the dry season. It is of interest to the policy formulation debate to note that with the current own generation of approximately 40 MW in the greater Freetown area most of the expected capacity from the BHEP will just about meet the demand of this area when it becomes operational. Furthermore, the BHEP is expected to supply power to other provincial stations along its route. Clearly with the availability of power, most privately owned generation will cease and there will be an obvious need for additional capacity if the vision of this energy policy is to be realized. One option is Independent Power Producers through some power purchase agreement with the GOSL. Alternatively additional capacity could be bought to complement the BHEP supply.

### **3.3.2.2 Rural Electricity generation and distribution**

Most of the plants in the rural areas are out of operation, the devastating effects of the war further compounded this dismal state of affairs. Recent estimates for the rehabilitation of the Provincial stations totals approximately Euros 13 million. In addition to the generation problems nationwide, most of the transmission and distribution equipment and buildings are old and in dire need of spares and/or total replacement.

The question now is how will Sierra Leone achieve reliable and sustainable urban electricity and embark on a rural electrification scheme. Decentralized energy services can be one of the solutions if it must provide sustainable growth in the energy sector in this millennium.

### **3.3.3 Petroleum sub sector**

Sierra Leone stopped refining crude petroleum several years ago and now has to import all the petroleum products used in the country. This type of arrangements poses major procurement and supply problems for the country. Financing procurement

of petroleum products require foreign exchange and guarantee arrangements which, most times, prove expensive, especially due to the relatively low quantities that the country needs. Uninterrupted supply of petroleum products throughout the country at affordable prices is a major goal for the downstream petroleum sector. However, the country is undergoing exploration activities for crude oil and such activities need to be intensified. It is necessary to set up systems that will adequately address the supply difficulties, bottlenecks in allocation or chartering of vessels and maintenance of vessels. Transportation problems in distributing petroleum products nationwide are creating problems for petroleum marketing companies and there is need to address adulteration/contamination and product storage problems. Monitoring and enforcement powers should complement regulations in the sector and the new legislation related to the operation of the Petroleum Unit is welcome.

The main challenges in the sector are as follows:

#### Upstream sector

- Inadequate resources available for investment in oil exploration and development activities; and
- Lack of legal and regulatory framework to attract oil exploration companies.

#### Downstream sector

- Relative low volumes of petroleum products requirements limit flexibility in procurement;
- Lack of adequate foreign exchange leads to complex and expensive procurement arrangements;
- Need to address supply and storage limitations for various petroleum products;
- Need for clear unified standards for operating retail outlets;
- Need for revamping the institutional and legal frameworks that regulate the petroleum supply industry;
- Lack of arrangements for national strategic petroleum stock; and
- Need for considering the feasibility of re-launching refining operation in the country.

### 3.3.4 Renewable energy, including fuelwood and charcoal

Sierra Leone heavily depends on traditional energy source (firewood and charcoal) for cooking and because of the many problems associated with the production and use of this source, shifting to a higher quality of energy for cooking is desirable. This shift should not involve greater use of kerosene, but expansion of the small existing market for LPG should be considered as some African cities have clearly demonstrated

the viability of this option. Another problem in this sub-sector is the relatively poor energy efficiency of the conversion technologies associated with this sub-sector. Hence, improving the overall efficiency of these technologies is very important.

Regulation in this sub-sector is either absent or very weak. Therefore the production, conversion and sales of fuelwood and charcoal, and also the development and use of improved stoves. The area that needs urgent attention is the regulation of the production of fuelwood and charcoal; the intense indiscriminate destruction of forest areas and grasslands in the mountainous areas in the city and in some sub-urban areas; the impact of this deforestation activity on agricultural practices and other areas are very visible and must be addressed as it would have positive effects on agricultural productivity.

In general, the fuel wood economy has relied very much on the bush fallow system. Nevertheless, wood yield from this source is declining due to the shortening of the fallow period because of pressures from rapid population growth and urbanization. The inability of people to switch to other fuels due to poverty, only further increases the demands on forestlands and grasslands in concentrated areas. It is estimated that 600,000 hectares of forestlands, representing about 8% total arable uplands, have been cleared for farming. Mining activities have left around 80,000 – 120,000 hectares deforested and degraded. In the main, these activities continue unabated and without control and reclamation. Therefore, deforestation in selected areas due to energy related activities need attention.

Addressing deforestation will require a combination of actions including establishment of adequate regulations, use of appropriate production technologies and end-use technologies, and awareness raising campaigns such as including forest conservation education in the curriculum of schools.

The main issues/challenges in this sub-sector are as follows:

- Depletion of forest resources in selected areas.
- Inefficient production and use of biomass energy resulting in adverse effects on the environment and the health of end-users, especially in rural households
- Large number of intermediaries in the fuel wood supply chain resulting in high retail prices.
- Lack of reliable information system in the sub-sector, resulting in poor planning and limited contribution to the energy supply mix.
- Poor development of competitive alternative energy sources due to lack of incentives.



- Absence of policies to promote the use of substitutes (such as agricultural residues, biogas, solar energy, peat, lignite and natural gas) that would lessen the demand for fuel wood.
- Unregulated production methods of charcoal.
- Low public awareness about the efficacy and potency of technologies in the sub-sector such as renewable energy technologies (RETs)
- Lack of mechanisms to monitor standards and ensure quality control of RETs
- Inadequate financing mechanisms and other incentives to facilitate investment, communication, promotion and dissemination of RETs and improved stoves.
- Inadequate data available on the potential of indigenous renewable energy sources, solar, wind, mini and micro hydro, etc
- No adequate regulation on RETs especially on guidelines for their production and code of practices

### 3.3.5 Energy efficiency and conservation

Sustenance in the entire energy sector requires consideration of energy efficiency and conservation in all its activities. Unfortunately, this aspect is not very visible in the energy sector of the country because of the non-existence of energy auditing. In general, there is inadequate awareness and improper attitudes towards the rational use of energy, as well as non-existence of legislation and regulatory framework for energy efficiency and conservation only worsen the situation..

In the electricity sub-sector, a significant share of the current high tariffs can be attributed to the inefficiencies in the operation of the national utility. Tariffs for industrial and commercial consumers are amongst the highest in the sub region. Due to the unreliability of electricity supply, most businesses now rely on self-generation, but because the tariff is high, the cost differential between electricity produced from the grid and private generation is narrowed. The impact of this practice on inflation can be serious as businesses pass the added cost to consumers. In general, the high cost of electricity are causing certain small business activities, such as welding, refrigeration repairs and various electronic repairs that are all electricity dependent to shut down as they cannot afford self-generation.

As previously mentioned, most households in Sierra Leone use firewood and charcoal in a variety of traditional stoves for cooking even in urban areas but these stoves are largely inefficient. Unfortunately, improved stoves and kilns and substitution fuels (LPG, kerosene) for cooking not extensively spread due to many factors such as cost, lack of awareness and other socio-economic barriers. Most of the urban households use electricity for lighting (using inefficient incandescent lamps) whereas the majority

of rural households use kerosene, which is more expensive. Appliances used in households (refrigerators, deep freezers, air conditioners, etc.) are old and mostly bought second-hand and are, therefore, energy-inefficient.

Among the key challenges and related issues are the following:

General Issues:

- Insufficient awareness among energy producers, suppliers and energy-users about energy efficiency and conservation possibilities and practices;
- Lack of incentives including financing mechanisms to invest in modern, more efficient energy technologies and practices; and
- Inadequate skilled manpower in energy management.

Economic sectoral issues:

- Industry sector
  - Dominance of old energy-inefficient technologies;
  - Inadequate skilled manpower in energy management; and
  - Inadequate financing mechanisms for investment in energy conservation measures.
- Transport sector:
  - Dominance of old fleet of vehicles that are energy-inefficient;
  - Inadequate mass transit system;
  - Absence of credit facilities to purchase new vehicles; and
  - Bad road infrastructure and low road maintenance resulting in increased fuel consumption.
- Agriculture:
  - Overdependence on human and animal energy;
  - Lack of data on energy requirements in agriculture; and
  - Lack of incentives to introduce mechanized farming.
- Households and institutions:
  - Lack of awareness of the potential of energy conservation in household use;
  - Insufficient incentives to introduce improved energy end-use technologies and fuel substitution;
  - Lack of information on energy efficient technologies; and
  - Lack of awareness of the socio-economic and health burdens of collection and use of traditional biomass fuels in rural areas on women.

### 3.3.6 Legal and Regulatory Framework

With the liberalization of Sierra Leone's economy, it is necessary that decisions pertaining to the energy sector should ensure appropriate energy supply and use. An efficient and sustainable energy sector needs open and competitive markets that will result in efficiency of allocation of resources. However, where markets are imperfect, energy prices may not accurately reflect the full social cost and energy suppliers may not choose the most efficient options. Government intervention may be warranted in such instances. With the ushering in of private sector participation in some of the energy sectors, especially the power sub sector, legislative and regulatory gaps would still exist, resulting into unfair practices by the players. This calls for government intervention to ensure fair play, protect consumers, ensure the financial viability of private investments, promote competition and collect information.

There are however plans in train to reform and better regulate some sectors.

#### **Power sector reform**

The Government, supported by the World Bank, is committed to the reform of the power sector. The rationale for reforms in the Sierra Leone Power Sector could be attributed to the following factors:

- Capital crisis;
- Performance crisis;
- Access crisis; and
- Cost burden to government.

The GOSL considers that a competitive market structure in which the private sector plays a role in the investment, management and operation is necessary. The objectives of electricity reform are to achieve efficiency, sustainability and improved access. However, recent events in the world show that their involvement would require a very strong and effective regulatory environment.

Institutional and operational reform will involve addressing sector governance and sector operation issues. In the area of sector governance, the role of the Ministry will be focused on electricity policy making. In house technical expertise will be beefed up to support this mandate. An independent sector regulator will oversee entry into the electricity sector, technical and safety performance of sector operations and tariff adjustments. A new Electricity Policy and the revision of the existing Electricity Act will be pursued.

The reform plan calls for transforming the existing NPA into a corporate, self-funding utility. It will mainly be a transmission and distribution company and act

as a producer of electricity in the last resort. Other corporate bodies of Independent Power Producers (IPPs) will be allowed to produce power and sell to the new NPA whose operation will be considerably shored up and made more efficient. BKPS will continue as a non-grid operation until reached by the national grid. Those provincial stations that will be connected to the national grid will be connected. Some isolated stations will require technical and financial support. Consideration is being given to the management of NPA for a few years through a performance-based management contract, during which period the operation will be considerably strengthened by the infusion of capital into appropriate areas. This will augur well for the entrance of a strategic partner and private sector participation in other areas of the power sector, especially in the provision of extra generation through IPPs. It is envisaged that Bumbuna will be operated as an IPP.

The main implementation activities associated with restructuring the electricity sector are variously of an institutional, organizational, legal and infrastructure nature. Although a possible timeframe for implementation of such activities is long, there are some that will need to be undertaken urgently. A budget amounting to \$50m has already been drawn up for these activities. Activities (including budget) for the proposed World Bank Power Sector Transformation Project (PSTP) indicate that the World Bank will only meet \$19.5 million of this amount.

With private sector participation in some of the energy sectors, especially the power sub sector, legislative and regulatory gaps would still exist, resulting in unfair practices by the players. This calls for government intervention to ensure fair play, protect consumers, ensure the financial viability of private investments, promote competition and collect information.

#### **Petroleum sub-sector**

The Petroleum unit performs some regulatory functions. A levy in the petroleum pricing structure supports the establishment of the unit. The Petroleum Unit is also being given a new reinforced mandate to serve as petroleum industry regulator/coordinator and the relevant legislation is being drafted accordingly. Principles of an open and competitive market will be established and regulated by the Petroleum Unit. Private initiatives and investments will be promoted and protected against discretionary interference, discrimination or favouritism.

## **Part III: Transformation of the Energy Sector: Policy Options and Strategies**

### **Chapter 4. Supply Side Policy Options and Strategies**

A number of possible strategic policy options can be pursued in order for Sierra Leone to realize its energy supply goals and objectives as desired for the energy sector. These options are discussed within the various sub-sectors as previously stated.

#### **4.1 Electricity power sub-sector**

The power sub-sector needs to be reformed not only to improve its overall performance but also increase access to electricity nationwide. Due to the limited financial capacity of government in meeting these needs, policy measures should be instituted to encourage participation from local communities and the private sector. This will require creating the enabling conditions for their participation. This could include decentralisation of the government's functions, thereby empowering local council initiatives, creating opportunities for the governance of electricity services in decentralised entities. The necessary technical and human capacities need to be developed to cope with these demands.

Another aspect that requires policy attention is the expansion of the power sub-sector supply base such as introducing electricity supply from renewable energy sources and tapping from international and regional initiatives like the West African Power Pool (WAPP). This will provide opportunities for increasing access to energy resources.

#### **Objective**

To increase access to safe, reliable, efficient, affordable and sustainable power supply for all Sierra Leoneans while meeting the national economic and social development needs.

## Policy statements

- The Government shall establish an adequate and transparent, legal and regulatory framework that is conducive to local communities and private sector participation in the development of the energy sector.
- The Government shall encourage entry of multiple players in power generation including private and public investors as Independent Power Producers.
- The Government shall develop a national grid that will extend the transmission line throughout the country.
- The Government shall promote the development of mini/micro hydro sites and other renewable energy technologies through different arrangements including public/private partnerships.
- The Government shall embark on different options for financing and operating rural electrification programmes.
- The Government shall encourage proposals by local authorities to provide and distribute power and will propose parameters for local government.
- The Government will actively participate in regional and sub-regional programmes aimed at the supply of electricity
- The Government shall institute measures aimed at improving the efficiency of the supply-side including reduction of electricity theft

## Strategies

- Implement the power sector reform strategy as outlined.
- Develop a competitive power supply sector with participation of local communities and private sector.
- Improve efficiency of existing distribution system and expand the system at minimum cost
- Rationalize electricity tariffs to reflect the marginal cost of supply in order to achieve economic efficiency.
- Create incentives to attract private sector investment including, wherever relevant and appropriate, access to loans on concessionary terms; financial instruments, government guarantees and “smart subsidies” (or grants) for infrastructure investment.
- Establish a regulatory agency to provide even-handed and predictable energy sector regulation
- Develop and implement a Rural Electrification Strategy and Plan along the following lines:
  - Progressive development of rural electrification schemes on a demand driven basis whereby capable sponsors can initiate and develop electrification projects;
  - Creation of a Rural Electrification Agency; and
  - Establishment of a Rural Electrification Board to supervise management of innovative funding mechanism schemes.

## 4.2 Petroleum sub sector (Upstream and Downstream activities)

### 4.2.1 Upstream activities

This sector is in its infancy and the companies granted leases by the GOSL have started setting up offices in Sierra Leone. There is, however, room for further exploration work and investment in the sub-sector. There is also a need to improve local involvement especially in human resources so as to enhance technical capacity in this sub-sector. Adoption of appropriate policies will result in further interests in exploration activities.

#### **Objective**

To ascertain the petroleum deposit potential of the country and to promote its development.

#### **Policy statements**

- The Government shall promote exploration for petroleum in accordance with best petroleum industry practices.
- The Government shall encourage major oil companies to invest in exploration in the sector.
- The Government shall promote indigenous capacity building schemes with the exploration companies to ensure local technical capacity.
- The Government shall encourage regional and international co-operation in exploration, development of infrastructure, trade, database and capacity building.

#### **Strategies**

- Create conducive conditions for attracting more investors in the sub-sector.
- Facilitate the acquisition of geological and geophysical data for assessing the petroleum potential of the country
- Build capacity and maintain an efficient institution to monitor and regulate petroleum exploration and development.
- Set up joint training schemes of nationals in all aspects of the petroleum upstream sub-sector

### 4.2.2 Downstream activities

The government will continue to address difficulties with supply, storage and availability of foreign exchange in the industry for procurement requirements. The

present distribution network is still restricted to urban areas and is limited to rural areas, hence attention is needed to improve rural supply systems to reduce the existing cost burden in these areas. The current plans for better regulation and monitoring should be implemented. However, as the oil industry operates within the international and regional context, certain areas need policy attention. These include: procurement of petroleum products, pricing of petroleum products and storage of petroleum products for security concerns. Addressing these concerns may require collaborative and proactive measures with the oil companies.

## **Objective**

To ensure an adequate and reliable supply of high quality petroleum products for all sectors of the economy at internationally competitive and affordable prices within appropriate health, safety and environmental standards.

## **Policy Statements**

- The Government shall work with its sub-regional neighbours to explore joint procurement of petroleum products.
- The Government shall keep appropriate levels of strategic stocks based on an assessment of the risk of supply disruption.
- The Government shall promote adaptation of international standards and codes of practice to suit local conditions within the industry
- The Government shall encourage petroleum companies to extend their marketing networks to rural and smaller towns in various parts of the country.
- The Government shall lend its support to schemes that will enhance cost reductions in the procurement of large stocks of petroleum products.
- The Government shall commission a study to assess the economic viability of operating the existing oil refinery.
- The Government shall ensure the institution of uniform petroleum products pricing policy countrywide.

## **Strategies**

- Supply all towns with populations of more than 10,000 with fuel directly from the marketing companies by 2010;
- Ensure that standards are set for lubricants to be utilized in the country and that there are testing programmes locally for these lubricants in line with best practices;
- Maintain a strategic supply stock through appropriate legislation that was developed with the oil companies; and
- Work with neighbouring countries to develop a joint procurement of petroleum products.



### 4.3 Renewable energies sub sector (Fuel wood and other biomass sources of energy)

The production and use of fuelwood in Sierra Leone is a major problem and need to be addressed so that the high inefficiencies associated with these practises and indiscriminate cutting down of trees in selected areas can be reduced. In general, addressing the latter will require measures to ensure sustainable forest resource management. The poor regulation of fuel wood and charcoal industries fuels inefficiency and increases costs to the consumer. Inefficient production and use of biomass energy results in adverse effects on the environment and the health of biomass energy users, especially in rural households. It is crucial that effective institutional frameworks are created to regulate the use of forest resources. By-products of wood and other agricultural processing industries should be introduced as alternatives to wood fuel.

#### **Objective**

To encourage and promote the sustainable use of fuelwood and encourage the possible introduction of substitution fuels.

To promote the development and use of renewable energy resources based on detailed study and analysis of their technical and economic feasibility

#### **Policy Statements**

- The Government shall promote improved biomass conversion and end-use technologies.
- The Government shall support research and development work in renewable energy sources and associated technologies.
- The Government shall ensure that environmental considerations are included in all renewable energy planning and implementation co-operation is enhanced with other relevant stakeholders.

## Strategies

- Support the dissemination of biomass and other renewable energy sources to increase their positive impact on the energy balance and the environment.
- Include renewable energy and energy efficiency in the curricula of schools, Universities, vocational training centres and other institutions of education.
- Support efforts to develop biomass resources in agreement with the National Forestry Policy.
- Legislate for the registering of associations and organizations involved with fuel wood, charcoal and improved stoves with the MAFFS.
- Promote agro-forestry enterprises – including fruit trees and mechanization in the Inland Valley Swamps.

## Chapter 5. Demand-side Policy Options and Strategies

### 5.1 Households and institutions (both rural and urban areas)

The household sector needs policy attention because of the overall poverty in both rural and urban areas, and also the heavy reliance on traditional fuels for the most important household activity. Such attention should aim at establishing energy security within the context of food security and innovative financing mechanisms to ensure sustainability. This policy attention will need to focus on the efficiency of both production and use of fuelwood and charcoal, and on a switch-over to more efficient and convenient fuels that will raise the overall quality of life of Sierra Leonean households.

Rural areas will need special attention because of lack of support infrastructure for a sound energy system. The communal spirit normally found in such areas should be exploited especially in looking at the production and use of electricity.

Policies that encourage the use of substitution fuels such as LPG for cooking should receive attention as being done in other African countries. Such policies should involve the supply, transportation, associated technologies and the safety of the use of these technologies. Sierra Leone at present would have to import all its LPG. Due to absence of clear policies, importation is extremely expensive. Suitable policies will reduce the price significantly as is the case in other West African countries.

There are excellent opportunities for use of RETs in households in both urban and rural areas, but these opportunities can only be exploited with the introduction of proactive policies by government.

The improvement of energy efficiency in different institutions is very much needed in the country, especially among those who use traditional fuels for cooking. Fuel substitution should be encouraged.

#### **Objective**

To increase access to reliable and affordable energy services in a sustainable manner for households and institutions, especially those involved in water supply and sanitation, health, education, public lighting and communication in order to improve the welfare of households and the operation of these institutions.

## Policy statements

- The Government shall encourage the use of efficient end-use technologies in households and public institutions.
- The Government shall encourage the use of alternative sources of energy for cooking, heating, cooling, lighting and other application.
- The Government shall set up regulation and safety standards to ensure safety of household energy appliances.
- The Government shall set up appropriate financial and administrative institutions to manage RETs.
- The Government shall consider incentive schemes such as reduction of taxes and giving out waivers for development and importation of RETs
- The Government shall promote energy auditing in public institutions to identify areas of energy efficiency intervention and/or energy substitution as found necessary.
- The Government shall encourage promotion and provide necessary incentives to actively pursue the local manufacture of RET-based systems.

## Strategies

- Develop a comprehensive Household Energy Plan, which adequately addresses issues related to energy supply shortages, inefficient use of biomass and affordability of modern energy services.
- Emphasize the adoption of energy demand management in middle and high-income households and in public institutional buildings.
- Provide incentives schemes to promote electricity and use of modern fuels in rural areas.
- Give incentives schemes for petroleum companies to improve distribution and marketing of LPG.
- Develop and facilitate adequate financing schemes for the development and promotion of RETs
- Ensure that RET producers and importers ascribe to certified performance and technical standards
- Encourage the use of appropriate matured RETs in government institutions such as hospitals, clinics, schools, etc. for sterilization and hygiene purposes
- Undertake necessary studies to address technical, economic, social and cultural barriers to the widespread use of matured RETs.
- Encourage co-operatives and energy service companies to facilitate the financing mechanism for RETs, and other energy technologies including energy efficient technologies.
- Lend support for specific rural electrification schemes especially those that involve the rural communities.
- Set up appropriate norms, codes of practice, guidelines and standards for RETs.
- Encourage local manufacture of RET generators.

## 5.2 Industry and Commerce

The provision of adequate supply of electricity is crucial for industry and the commercial sectors. Therefore, adequate policies should address the issue of availability of power for business establishments beyond the capital and other urban areas as power supply in those areas are very poor or non-existent. An important aspect of policy concern in this sector is the promotion of energy efficiency. Businesses in areas not connected to the grid or in which the availability of grid power is severely restricted are faced with many problems including environmental and safety problems related to the use of auto generation, and policy measures should address such issues. The possibility of “net metering” options between industries and the public utility could be considered for industries in rural areas.

### Objective

To cater for the power needs of industrial and commercial sectors and introduce energy efficiency measures in these sectors so as to result in overall financial and environmental benefits that will improve their competitiveness.

### Policy Statements

- The Government shall adopt measures to improve the quality and cost effectiveness of energy supplied to the industrial and commercial sectors.
- The Government shall promote energy management practices and regulated involvement of the sector to improve compliance
- The Government shall encourage the efficient use of alternative energy sources.

### Strategies

- Develop suitable training programmes and create incentives for industries to facilitate adoption of energy efficient supply and end-use technologies.
- Make energy audits mandatory for industries and set up regulations that promote energy efficiency and conservation measures.
- Set up energy efficiency centers that disseminate information, undertake demonstrations, and appropriate sectoral analyses and training programmes.
- Enforce environmental performance auditing.
- Improve co-ordination of institutions concerned with energy, industry and environmental issues.
- Give financial incentives for practicing energy efficiency measures
- Introduce “time-use” and ‘life line’ electricity tariffs for industries.

## 5.3 Mining

Mining is a very important activity in Sierra Leone's economy and will remain that way in the future because of the significant mining deposits in the country. Due to the large energy requirements by the large-scale mining companies, and the absence of a national grid, these companies operate their in-house generating and distribution facilities. However, with the prospects of developing a national grid the mining companies will tap into the grid. This will prove advantageous because this arrangement will assist with rural electrification. Formulating policies that will encourage mining companies to exploit their corporate social responsibility in assisting with the provision of energy service to rural areas should be considered. In this regard, voluntary agreements with these industries should also be considered. In future, surplus power from self-generating facilities from mining companies can be made available for power exports through the proposed national grid. However, there will be need to develop suitable power purchasing agreements between the national utility and the respective mining companies including their associated environmental implications.

### **Objective**

To facilitate access by mining companies to reliable energy that will result in increased efficiency and output.

### **Policy statements**

- The Government shall enter into partnership with mining companies in the development of high quality energy and to improve access.

### **Strategies**

- Mining companies will be encouraged to have an increased energy mix in energy generation and distribution. Mining companies will be encouraged to provide and possibly sell power to communities in the environs of their mining areas.

## 5.4 Transport

The transport sector is regulated regarding energy but needs significant policy attention to improve efficiency and effectiveness. One area that is of great concern is the relatively low density of paved road and the conditions of the roads. Policy attention is needed to increase the road density and improve its quality because road congestion in major cities is rampant. Improving road safety is also of concern as it has impact on the energy sector as well. However, there is now a road fund that is being managed by the Sierra Leone Roads Authority (SLRA), but it could perform better if there is an independent board to assist with the management. Fiscal policy measures that will encourage newer, more efficient transport systems and mass transit systems should be contemplated in improvement in the transport policies. Environmental problems could be addressed by several measures, which are aimed at more efficient fuels and transport systems.

Setting up a policy that will directly improve the energy efficiency in the overall transport sector is very important as this will produce economic benefits.

### Objective

To promote efficient and environmentally-friendly transport system that will optimize the utilization of petroleum fuels to all parts of the country.

### Policy Statement

- The Government shall promote measures to encourage efficient mass transport systems with greater participation of the private sector
- The Government shall provide adequate transport fuels for the transport system of the country.

### Strategies

- Formulate fiscal and transport policies to promote energy conservation and efficiency.
- Introduce measures aimed at improving pollution control including the use of environmentally friendly fossil fuels e.g. unleaded gasoline, improved gasoline, low sulphur diesel
- Improve policy on importation used vehicles to reflect efficiency and environment concerns.
- Develop other modes of transport such as boat transportation to coastal areas.
- Explore the feasibility and viability of using bio-fuels and hydrogen for transportation.

## 5.5 Agriculture Sector

The main energy challenge within agriculture is to ensure adequate supply of cost-effective energy to meet the requirements for improved agricultural activities, including enhanced agricultural mechanization, agro-processing and irrigation. There is a need to transform the agricultural sector that is presently peasant-based to a fully commercial sector with high degree of mechanization. This will require the creation of a more commercial environment and encourage entrepreneurs to develop and distribute energy products and technologies in order to improve efficiency in agricultural production and add value to agricultural products. Furthermore, methods and approaches on how to maximize the use of alternative sources of energy such as, micro-hydro, solar, wind, biomass, and other renewable energies, need to be developed and commercialized. Agricultural activities are mainly in rural areas where fuel availability is low and costs high.

There could be considerable room for improvement in certain traditional agricultural related practices like fish drying, salt making etc. by utilizing better energy-efficient measures.

### Objective

To increase the use of modern energy in the agricultural sector so as to increase agricultural production, and to achieve the country's food security objectives.

### Policy statements

- The Government shall promote measures that will ensure sufficient energy supply to meet the increasing demand in the agriculture sector and promote industry, thereby creating employment and economic growth.
- The Government shall create an enabling environment for all stakeholders engaged in research and development, the distribution and use of energy products and development of appropriate energy technologies for agriculture.

### Strategies

- Farmers will be encouraged to implement mechanization that focuses on providing access to energy services, which help to raise the productivity of the agricultural sector.
- Capacity building, information and awareness campaigns will be undertaken and facilities to finance energy services for rural agro-processing will be provided.
- Measures will be taken to ensure that petroleum products are readily available in rural areas.



## 5.6 Rural energy issues

Most rural economic activities including agriculture, business, social services are highly influenced by energy services. Less than 1% of the rural population has access to electricity. The low consumption of commercial energy has hindered economic growth, which is manifested in low levels of agricultural mechanization and industrialization. The development of commercial activity provides services and employment for people living in underdeveloped areas. Modern energy services are an essential input for the development of commercial activity. Electricity, in particular, is a key requirement for commercial activity. Where the supply of grid electricity is impractical, costly or delayed, alternative electricity supplies are required.

Many of the measures to be taken have been addressed under specific energy sub sectors. The utilisation of renewable energy and energy conservation measures can play a major role in rural areas. The main objective should be to use cost effective sources of renewable energy in areas where conventional methods of electrification cannot be economically justified. It is preferable to fashion such projects to community needs. The projects should seek to complement priority government programmes in education, health and sanitation.

Of all renewable energy technologies, photovoltaics (PV) exhibit several technical and economic advantages and show potential for viability in many communal applications, requiring modest power demands.

PV systems however may not be economically viable for large capacity and for heating. Biogas plants could be an option where the target villages are located near cattle ranches or agricultural centres with problems of waste disposals.

The introduction of liquid petroleum gas (LPG) as an alternative fuel for cooking is also a viable option. The popularisation of these technologies however requires a strong support from government and the local institutions. Addressing the problem of rural energy services requires a number of policy measures chief amongst which is to address institutional problems.

## Objective

Improve on the traditional methods of supply of energy to rural areas and take measures to markedly improve on the provision of commercial energy services to contribute meaningfully to the social and economic development of rural areas.

## Policy Statements

- The Government shall establish a Rural Electrification Strategy and Plan to address all aspects of rural electrification and power needs while making use of the institutional structures of local councils and other stakeholders.
- The Government shall set up a Rural Electrification Fund that will be accessed by all rural communities. This will be done according to best practices in the field.
- The Government shall support research and development in the field of rural energy
- The Government shall promote the application of alternative energy sources other than fuelwood and charcoal in order to reduce deforestation, indoor health hazards and time spent by rural women in search of firewood.
- The Government shall endeavour to facilitate increased availability of energy services, including grid and non-grid electrification to rural areas
- The Government shall establish norms, codes of practice, standards and guidelines for cost effective rural energy supplies.
- The Government shall set up mechanisms for the involvement of private stakeholders to participate in the different rural energy development schemes.

## Strategies

- Progressive development of rural electrification schemes on a demand driven basis whereby capable sponsors can initiate and develop electrification projects;
- Creation and capacity building of a Rural Electrification Agency;
- Establishment of a Rural Electrification Board, a Rural Electrification Fund and a transparent mechanism for funds disbursement to bring down capital costs through the provision of grants and loans for rural electrification schemes; and
- Financing rural electrification programme through:
  - Legislating rural electrification levy as part of national utility electricity bills.
  - Government targeted funding provision to local councils.
  - Donor and other agencies funding.

# Chapter 6. Governance and Other Cross Cutting Issues

## 6.1 Energy Governance: Coordination and rationalization of responsibilities

Governance is the complex set of processes and control relationships, which occur between various players. In the energy sector of Sierra Leone, the myriad of players with a well-structured coordination mechanism makes energy governance difficult. Not surprisingly, the range of players and the complexity of their inter-relationships make energy sector governance difficult to understand, and even harder to manage. The clarification of roles is therefore important. As much as rational structures can be drawn up to integrate the energy sectors, the political acceptability, financing, limitations in resources and capacity problems would need to be taken into consideration in suggesting new governance structures.

Policy measures should take into consideration the need for consolidation of functions. Capacity building and institutional building have been identified as key to getting the energy sector off the ground. Without proper energy planning and statistics it will be difficult to initiate action on energy issues. The restructuring of the overall energy sector to involve fewer Ministries should be pursued and policies put in place to this effect. There are plans afoot to create a technical wing in the Ministry of Energy and Power. Measures should be put in place to ensure it liaises effectively with other energy related Ministries especially for planning purposes.

### **Objective**

To institute a new governance structure for the energy sector that would meet the challenge of developing a coherent and clear framework of energy governance, which addresses in an integrated manner, the key issues that will guide the effective implementation of the energy policy.

### **Policy statements**

- The Government shall review existing institutional arrangements with a view to ensuring the efficient management of the energy sector.
- The Government shall institute mechanisms to facilitate the effective implementation of the energy policy and in so doing achieve the economic, social and political goals.

## Strategy

The government will, in the short-term, retain the present sub sectoral arrangement of the energy sector which is as follows:

- Ministry of Energy and Power is responsible for the Electricity/Power sector including hydro and other renewable energy resources development
- The Ministry of Agriculture, Forestry and Food Security is responsible for the traditional energy sector which includes mainly biomass
- The Ministry of Trade and Industry is responsible for petroleum marketing and sales
- The Presidential Petroleum Commission to remain under the President's office and be responsible for petroleum exploration and production
- The Ministry of Mineral Resources responsible for the exploration and exploitation of minerals, including energy minerals
- The Ministry of Economic Development and Planning responsible for overall economic and social development and allocation of resources for the development of energy projects.

The government however commits itself to the gradual consolidation of the energy sector over the medium term and will commission a study to determine the best structure that will meet the governance needs of the energy sector.

## 6.2 Energy Planning

Energy needs should be analysed in terms of how their fulfilment will contribute towards attaining national economic and social goals. The potential of energy supply systems and demand side management to meet current and potential future energy needs should also be assessed. This would include analyses of individual supply sub-sectors and the linkages between sub-sectors. Energy Planning requires sufficient capacity to carry out these technical functions and to engage with energy policy processes. Such capacity does not currently exist within Sierra Leone and consequently there is an insufficient level of information required to inform policy development on the energy sector. There are key policy challenges that must be addressed. The World Bank is funding an energy planning unit for the Ministry of Energy and Power, which, at present, has no technical wing.

### Policy statement

- The Government shall establish and resource appropriate structures and systems to carry out energy planning functions within the Ministry of Energy and Power.

## Strategies

- The Central Planning unit will consist of planners disciplined in all the energy sub-sectors who will be required to liaise extensively with line ministries and agencies for input into the planning process.
- The government will provide the necessary resources to operate energy planning structures and systems. Apart from the central planning unit within the Ministry of Energy and Power the government will support the strengthening of sub-sectoral planning and information gathering units

### 6.3 Fiscal and pricing policy

The selective use of fiscal mechanisms can be a very effective strategy for achieving energy policy objectives, such as encouraging fuel switching, raising dedicated sources of finance for particular needs and encouraging more efficient environmental and resource management. On the other hand, unconsidered usage of fiscal mechanisms within the energy sector can lead to unintended consequences, perhaps even directly contradicting government's other economic and social policies. It is therefore essential that fiscal policies are aligned with energy policies, particularly as competition increases between energy service providers.

#### Policy statement

- The Government, without introducing structural distortions into the market, shall use selective fiscal mechanisms in promoting the use of certain types of fuels with the intention of satisfying future energy use goals and in increasing access to energy services especially to the poor.

### 6.4 Financing energy investment

The opportunities for investment in the energy sector are vast in monetary terms, and substantial in terms of economic development impact. With reforms taking place in the energy sector such as the liberalization of power generation, petroleum product trade, and emphasis on enhancing rural energy supplies, private investment is bound to increase substantially. There is, therefore, a need to make domestic and international investors aware of the potentials within the energy sector. Public and private sector partnerships should be encouraged to invest in provision of energy services. Furthermore, there is a need to facilitate and encourage investment in the development of alternative sources of energy, putting emphasis on the utilization of indigenous resources.

## Policy Statement

- The Government shall promote private initiatives at all appropriate levels for local and foreign investors to be made aware of the potentials within the energy sector.

## 6.5 Energy information systems and dissemination

Energy information systems are important tools for policy implementation. Energy information collection, storage, analysis and exchange are vital for planning, policy formulation and in decision-making for implementation of programmes and policies. In Sierra Leone, there is a lack of an energy information system, resulting in poor information exchange amongst energy stakeholders. There is also inadequate capacity to manage and analyze energy information. There is a need for establishing a proper energy information system that will mobilize human resources and undertake sensitization and information dissemination to stakeholders in the sector for effective implementation of the energy policy.

## Policy Statement

- The Government shall establish and/or strengthen an energy information and communication system.

## Strategies

Comprehensive strategies will be developed to build knowledge, skills and confidence, and, where necessary, change attitudes and behaviour. In particular such strategies will aim to:

- Enable consumers to make informed decisions regarding the safe, healthy, efficient and environmentally-sustainable use of energy;
- Enable representatives (particularly at community and local government levels) to proactively take up the energy issues of the communities they represent; and
- Enable development and health practitioners to provide appropriate advice and practice and to integrate energy needs into project planning and implementation.

## 6.6 Energy efficiency and conservation

There is a need for government to play a role in facilitating increased efficiency in the use of energy. Barriers to the adoption of efficiency measures include:

- Inappropriate economic signals;
- Lack of awareness, information and skills;
- Lack of access to efficient technologies;
- High return on investment criteria; and
- The high cost of capital.

### **Policy statement**

- The Government shall endeavour to promote energy efficiency and the development of holistic programmes for households, industry and commerce.

### **Strategies**

- Capacity building on energy auditing and efficiency analysis.
- Linkages with sub-regional institutions and other international organizations concerned with energy efficiency.
- Sensitisation of consumers to the importance of energy efficiency and its relationship to productivity and economy of scale of investment.

## **6.7 Energy and environment**

Environmental implications of energy consumption need to be considered in all sectors. Uncontrolled use of woodfuel puts pressure on forests and leads to erosion, desertification, and contributes to carbon-dioxide emission. The combustion of fossil fuels produces significant amount of pollutants. Further, there are environmental impacts of the construction of transmission lines and pipelines. On the other hand, renewable energy sources, including solar, wind, and geothermal have rather small negative environmental impacts. The production and consumption of energy should not endanger the quality of life of present and future generations.

### **Policy Statements**

- The Government shall promote Environmental Impact Assessment (EIA) as a requirement for all energy programmes and projects
- The Government shall encourage the identification and development of alternative energy sources including renewable energies and promote wood fuel end-use efficient technologies to protect woodlands and catchment areas.
- The Government shall monitor international developments and participate in negotiations around response strategies to global climate change, in order to progressively balance its environmental responsibilities and development interests, along with health and safety related local issues, in these processes.

## 6.8 Research and Development

Research and Development (R&D) efforts that give rise to technological innovations in the energy sector are important as they lead to development and economic growth. R&D issues relating to biomass, rural energy, energy end-use, affordability, and pricing mechanisms need greater attention. The challenge is to overcome the inadequate financial resources and lack of skilled manpower for R&D. There is also a lack of understanding and appreciation of critical energy R&D issues both within the sector and for the general public. There is a lack of institutional co-ordination in respect of various ongoing research activities in the sector. There is also a need to support regional and international co-operation in R&D on technological and non-technological advancement in the energy sector.

Efforts are also necessary in providing indigenous solutions through R&D of RETs especially in the use of local materials and expertise aimed at local industries. There must be a deliberate effort at improving on the commercial marketing of R&D products through policy interventions towards a more productive and viable cooperation with the private sector.

### Policy Statement

- The Government shall explore all opportunities to promote and support relevant R&D activities in the sector

### Strategies

- Provide monitoring and coordination of R&D activities in various institutions;
- Initiate approaches to R&D institutions to investigate issue of mutual interest for joint cooperation; and
- Create linkages with the private sector for the promotion and commercialization of products of R&D institutions through for example demonstration exhibitions and trade fairs.

## 6.9 Gender and Energy

Gender issues in the energy sector should focus on the energy needs and ownership of resources. Gender issues should be looked at from both the demand and supply of energy. On the demand side, men and women have different demands on energy due to the existing socio-cultural and traditional roles. On the commercial energy supply side, it is clear that women are under-represented at all levels of energy generation, transmission and distribution. There is, therefore, a gender imbalance at various levels



of planning and decision-making within the energy sector. On the demand side, especially in rural areas, there is a need to relieve women from the burden of searching for energy, especially wood-fuel. The reduction in collection of traditional fuels and the improvements in indoor air quality made possible through the availability of modern cooking fuels have a huge positive impact on the lives of women and children.

### **Policy Statement**

- The Government shall facilitate education and training for women in all energy aspects.
- The Government shall promote awareness on gender issues concerning men and women's social roles in the energy sector and encourage greater inclusion of women in the decision-making and policy implementation processes of energy matters.

## **6.10 Capacity building and capacity development**

The majority of Sierra Leoneans are poorly informed about energy and related end-use practices and options. Manifestations of this situation include: low level of renewable energy application, inefficient use of energy and economic non-competitiveness of Sierra Leonean products.

The development of the energy sector is dependent on the appropriate utilization and development of human resources. A gender balanced human resource development programme for the energy sector is an important tool in order to ensure the fair provision of training and education. There is a lack of trained and skilled energy experts in the sector, particularly, women. In addition, there are inadequate incentives to attract and retain qualified energy experts in the sector. The present situation is also constrained by cultural and traditional influences, which inhibit gender-balanced training.

### **Policy Statements**

- The Government shall promote the development of a critical mass of experts in all aspects of energy management.
- The Government shall encourage energy education in school curricula, vocational training centres, colleges and other relevant learning institutions; emphasis will be put on practical aspects including physical demonstration, installations and operation.
- The Government shall encourage local and foreign investors in the sector to provide in-service training in essential skills.

## Strategies

- Government should allocate appropriate funding and staffing to undertake and support capacity building, education and information dissemination programmes and provide tax incentives for training.
- A deliberate intervention will be made to increase women's participation and training in energy related matters.

## 6.11 International and regional energy trade and cooperation

Co-operation between neighbouring countries in Africa and international bodies is vital for development and economic growth. Sierra Leone is a member of various bodies in the region, including the African Union (AU) and ECOWAS. It is part of the West African Power Pool under which member States will eventually be linked through a single electricity grid. Apart from these regional bodies and institutions, Sierra Leone is active in international agencies and forums of the United Nations and the Commonwealth in the field of energy.

There is a need to encourage joint development of common (shared with other countries) energy resources as a way of enhancing co-operation and collective reliance and security of energy supplies.

### Policy Statements

- The Government shall encourage collaboration within the West African sub region in energy related matters with emphasis on future interconnections
- The Government shall facilitate international and regional collaboration in research, exchange of information, capacity building and the training of energy specialists.

## Part IV: Guidelines for an Action Plan

### Chapter 7. Guidelines for an Action Plan

It is imperative in a policy document to provide a realistic priority list for implementing recommendations and policies that are aimed at redressing this situation within time frames that can be sustained both in terms of financial and capacity considerations. A priority list of actions in the formulation of an action plan should be recommended.

The strategic considerations from a national perspective, should aim at creating structures that will provide a balance between the energy demand and supply side, as well as establishing the energy resource potential in Sierra Leone.

Based on the goal of achieving a 35% electrification rate in the country by 2015, the time frame recommended is in terms of short term (2005-2007), medium term (2008-2011) and long term (2011-2015).

The successful implementation of the recommendations of the policy document depends largely on the availability of funds especially given the various competing sectors. Various donor and international organizations, the Government and the private sector will fund the considerable amount of investment required in the sector.

#### 7.1 Defining priority actions

The crucial role energy plays in achieving sustainable development aspirations including poverty reduction is often overlooked by governments and its consideration quite often relegated after other welfare issues such as health and education. The fact that energy provision is pivotal to these development issues remains ignored.

Economic efficiency-based energy pricing that takes account of equity conditions, competition and other institutional, legal and regulatory frameworks should be encouraged in designing energy strategies for sustainable development. Security of energy supply could be ensured by looking at the options of diversifying energy sources to consumers as well as improving energy efficiency, promoting energy substitution and developing cross-border energy trade within sub-regional cooperation.

Decentralized energy services for rural energy provision is a central consideration for this target group of consumers judging from their energy use profile and income base. Therefore innovative financing schemes such as micro-credit, energy service

companies and cooperative arrangements should be considered in the debate for rural electrification and energy service provision.

The actions taken for the rural energy provision must take into account the income base of the target groups because among the population depending on the agricultural sector as a source of income, 75% poverty levels are recorded.

In general the priority actions required to ensure a successful implementation of the policies recommended are as follows:

### **Governance**

- The establishment of an adequate and transparent, legal and regulatory framework that is conducive to private sector participation in the development of the energy sector;
- The review of the existing institutional structures governing the energy sector with a bid to providing a more efficient coordination and management of their activities;
- Implement the power sector reform strategy already outlined for the sector; and
- Develop and implement a Rural Electrification Strategy and Plan.

### **The petroleum industry**

- Facilitate the acquisition of geological and geophysical data for assessing the petroleum potential of the country
- Develop a mitigation plan to reduce environmental hazards in all oil operations.
- Build capacity and maintain an efficient institution to monitor and regulate petroleum exploration and the development of the industry. This will include guidelines for best practice, storage and stock level issues and uniform pricing nationwide.

### **Household energy provision**

- A comprehensive Household Energy Plan, which adequately addresses issues related to shortages and inefficient use of biomass and affordability of modern energy services, will be developed.
- Appropriate norms, codes of practice, guidelines and standards for RETs will be instituted thus creating an enabling environment for its sustainable development

- Facilitate adequate and sustainable financing mechanisms to ensure greater accessibility of RETs.

### **The transport sub-sector**

- The formulation of fiscal and transport policies to promote energy conservation and efficiency
- Capacity building on energy auditing and efficiency analysis with a view to creating awareness of its importance in energy planning and management

### **International cooperation**

- Facilitation of international cooperation and regional collaboration in research, exchange of information, capacity building and the training of energy specialists

### **Gender issues**

- Greater involvement of women in all aspects of energy planning and management.

## **7.2 Determining the time frame**

The time frame recommended is in terms of short term (2005-2007), Medium term (2008-2011) and Long term (2012-2015).

## **7.3 Determining the quantum of investment required and establishing performance indicators**

Issues related to the proper implementation of policy objectives can be treated in terms of short term, medium and long term. In order to properly plan for and assess the performance indicators of the different sectors, there is need to properly focus on the energy market, finance, Governance, capacity development and the role players or actors in the sector. There should be a phased assessment of these performance indicators by sectoral activities over the short, medium and long terms.

The need for mapping out the route towards achieving a target of 35% availability of electricity nationwide by the year 2015 presents enormous challenges, not least of all, financial, especially considering that the current access rate is about 10%. The question therefore is 'how can this be realistically achieved?'

Calculations reveal that an investment of US\$12m/year will be required by the Government to achieve this assuming a sum of 500kWh/capita/year (as quoted by the World Energy Assessment Report), with 35% availability for the basic energy need requirement at a cost of US\$1m/MW. This sum does not consider the population growth rate and assumes a present population size of 5.6m. The quantum of investment needed therefore is in the region of \$36m, in the short term and \$48m in the medium and long terms respectively.

Appendix 1 which mainly relates to the short term provides a profile of key policy issues linked with objectives and key performance indicators to assess the level of success of the policies. A summary of the costing is provided in Table 9. A large part of these costs relate to setting up the proper institutions and structures that will ensure proper functioning of the sector.

**Table 9: Summary of costs for programme of intervention measures over the short term**

Area/Sub sector	Funding required Million US \$	Funding available Million US \$	Funding remaining Million US \$
Sector Governance/Electricity	89.3	20.5	68.8
Household Energy-Biomass/Other RETs/LPG	4.7	0	4.7
Petroleum	9.5	0	9.5
Total	103.5	20.5	83.0

Source: Adapted from Appendix 1

This expenditure, totaling \$103.5 million, is in addition to the total of \$132m projected for the provision of extra electricity capacity for 35% access up to 2015.

It is recommended that scenario analysis be done of the key priorities in the Action Plan using, for example, availability figures of 15%, 20% and 35% for a period of 2005-2007, 2008-2011 and 2012-2015, i.e., short term, medium term and long term.

## 7.4 Establishing monitoring and evaluation mechanisms

It is essential that a structured framework for monitoring the progress made in the implementation of the policies approved by Government is established. The Energy Commission recommended could be authorized to perform these functions especially considering its technical expertise. Sub-sectoral units should be formed within the Commission for this exercise consisting of energy experts, economists, social scientists and civil society groups for a transparent evaluation process. Findings should be

factored into the economic analysis and budgetary discussions of government and made available to development partners.

## 7.5 Identifying sources of financing

The successful implementation of the recommendations of the policy document depends largely on the availability of funds especially given the various competing sectors. Some may argue that energy is not a priority, but a means to realizing the priority development programmes of government. This then implies that it must be given adequate budgetary considerations if the development strides being made by government are to be sustainable. Funding requests could be made to the UNECA, GEF, under the Kyoto Protocol Clean Development Mechanism provisions, the World Bank, ESMAP, BADEA, JICA, OPEC, AfDB, and other funding agencies in the field of energy development. The GOSL must also make counterpart provisions for these activities to show its commitment and support to their realization and a turn-around in the fortunes of the energy sector. It should also be realized that with the proper implementation of policies, the private sector could play a significant role in financing various energy projects.

## 7.6 Identifying the major actors<sup>8</sup>

The success of a national policy depends largely on the structures and mechanisms that are formulated for its implementation. These institutions can be identified by activity as follows:

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8 There is need to identify the main actors in the implementation of priority actions

Activity	Sub-sector	Existing actors	Proposed actors
Demand side objectives and strategies	• Households and Institutions	MAFFS,MTI,MEP,MLCPE,MHS,MEST	MAFFS,MTI,MEP,MLCPE,MHS,MEST
	• Industry and Commerce	MTI,MMR,MEP,MOTC,MF	MTI,MMR,MEP,MOTC,MF
	• Transport	MOTC,MF,WB,EU,MWTS	MOTC,MF,WB,EU,MWTS
	• Agriculture sector	MAFFS,MF	
Supply side objectives and strategies	• Electricity/Power sub-sector	MEP,WB,AfDB,EU,MF,PO	MEP,WB,AfDB,EU,MF,PPIAF,EU,NCP,PPIAF,EU,PO,NCP,CSO,ECOWAS
	• Petroleum sub-sector (Upstream and Downstream: activities)	MTI,MPA,MMR,MF,PO,MWTS	MTI,MPA,MMR,MF,PO,WB,EU,DFID,MLGRD,LC,MWTS
	• Renewable Energies sub-sector (Fuelwood and other renewable sources of energy)	MEP,MAFFS,MF,GEF,UNEP,MLGRD,LC	MEP,MAFFS,MF,GEF,UNEP,MLGRD,LC,USAID
Governance and cross cutting issues	• Governance and institutional capacity • Capacity building and capacity development	MEP,MTI,MEP,MOTC,MAFFS,MF,MWTS,EU,WB,AfDB,UNDP,DFID,MSWGCA	MEP,MTI,MEP,MOTC,MAFFS,MF,MWTS,EU,WB,AfDB,UNDP,DFID,MLGRD,LC,MSWGCA
	• Energy planning • Fiscal and pricing issues • Energy Investment	MEP,MF,MAFFS,MTI,	MEP,MF,MAFFS,MTI,MOTC,EU,WB,AfDB,UNDP,DFID
	• Energy information system and dissemination • Gender issues	MEP,MAFFS,MTI,MIB,MSWGCA	MEP,MAFFS,MTI,MIB,MSWGCA
	• Energy efficiency and conservation • Research and Development	MEP,MF,MAFFS,MTI,MEST	MEP,MF,MAFFS,MEST,MTI,MOTC,EU,WB,AfDB,UNDP,DFID,MYS,USAID
	• Energy and environment	MLCPE,MAFFS,MEP,MOTC,MHS	MLCPE,MAFFS,MEP,MOTC,MYS,MHS,GEF
	• International and regional energy trade and cooperation	MEP,MTI,MAFFS,MFA,PO	MEP,MF,MAFFS,MEST,MTI,MOTC,EU,WB,AfDB,UNDP,DFID,PPIAF,MFA,PO



## Part V: Conclusion and the Way Forward

### Chapter 8. Conclusion and the Way Forward

This energy policy document will be the basis for progressively expanding investment in modern energy production, petroleum exploration and development, rural electrification, the supply of well priced petroleum products, and for increasing the efficiency of energy use in all sectors from the household consuming biomass for cooking to the big industries and the transport sector.

Although several policy options have been proffered, particular attention should be paid to those addressing supply and governance issues.

A number of new institutions have been proposed for various purposes. Key amongst these are the Energy Commission, a Rural Electrification Board and a Rural Electrification Fund. The process of decentralisation that has been embarked upon by the GOSL with the creation of local governments is an important step towards the realization of these institutions. The reform of the electricity sector has been well charted out and the World Bank is funding the short-term reform measures, but Sierra Leone needs to properly monitor these short-term measures and also map out a long-term reform path for the country.

The vision outlined by stakeholders to make modern energy services available, accessible and affordable throughout the country and to provide access to electricity for 35% of the population by 2015 is certainly achievable. This vision cannot be realized however without a paradigm shift in the way energy issues are addressed. Major reforms would be needed for the energy sector. Such reforms would require legislative action, meeting the investment needs, institutional reforms and resolving management issues, including issues of inefficiency and mismanagement.

The formulation of this policy has been at the urging of government. Various government ministries and agencies have given their unstinted support to the entire policy formulation process. There has also been a welcome participation by decision-makers like Parliamentarians and local government councillors at the stakeholders' meetings. Notwithstanding these, government must ensure ownership of the policy in a sustained manner. There will be an obvious need to disseminate information on the policy to the public and ensure that areas in the policy document alluding to government's responsibilities are followed through with respect to both funding and execution.

The policy adoption process will start with its review and approval by Cabinet. Parliamentary ratification will be sought after this. It should be noted that members of the Parliamentary Committee on energy and power and local councillors were present at the last stakeholders' meeting at which the draft policy was fully discussed. Their views on issues like the Rural Electrification Fund have been fully taken into consideration in this policy document. Undoubtedly, implementing many aspects of the policy will require an interdisciplinary approach, involving various ministries. Also in the light of budgetary constraints, there will be need for prioritisation of some actions. Lawmakers are fully aware of the need to consider energy issues seriously and speedily because of the profound effect this will have on the socio-economic life in the country. There will, therefore, be a need for setting up of a Ministerial sub-Committee to prioritise issues and proffer an action plan based on several other related considerations by government. It can be confidently said that Sierra Leone will be on a path of accelerated development with the adoption of this policy and the implementation of its various aspects.

# APPENDIX

## Appendix 1

### Programme of Intervention Measures in Energy Sector \*

\* This does not include private sector funded projects, which could be considerable in extent

#### Sector Governance/Electricity Sub Sector

Project	Objective	Activities	Key performance indicators	Funding required US\$ m	Funding available US\$ m	Funding remaining US\$ m	Implementing Ministry/ Agency	Project start Date	Comments
Refurbishment of Western Area Distribution network	To restore power to remaining areas of distribution network and to take measures to reduce losses and improve on efficiency of supply	+Study on work content and prioritization	+Lower levels of power outages +More reliable electricity supply + Reduction of system losses	10	0	10	NPA	2005	
Refurbishment of Auxiliaries at Kingtom Generating station	-To improve on fuel efficiency and efficiency of generation	+Refurbish cooling system, sludge, fuel and lube system	+Lower fuel usage for generation +Possible lower electricity tariffs	2.5	0	2.5	NPA	2005	
Restoration of Provincial electricity stations	To restore electricity supply to the Provincial generating stations that had power before the conflict	+ Activities as per Cohort report	+ Resumption of business activities requiring power in Provincial areas +Improved quality of life in Provincial areas	13	0	13	NPA	2005	
Provision of assistance to BKPS	To improve on the generation, transmission and distribution of electricity and the overall services provided	+ Overhaul generators +Refurbish transmission and distribution system +Provide logistics	+Improved electricity supply in Bo Kenema and outlying areas +Intensification of economic activities needing power in these areas	6	0	6	BKPS	2005	

Project	Objective	Activities	Key performance indicators	Funding required US\$m	Funding available US\$m	Funding remaining US\$m	Implementing Ministry/ Agency	Project start Date	Comments
Expansion of Dodo dam-BKPS	To provide an additional generating capacity of about 4 MW from the Dodo dam	+ Feasibility studies +Construction of dam Expansion of services	+Improved electricity supply in Bo Kenema and outlying areas +Intensification of economic activities needing power in these areas	4	0	4	BKPS	2007	
Completion of Bumbuna Project-Phase2-Yiben	To provide additional capacity to meet growth in demand	+ Feasibility study only	+Timely start of Yiben, the second phase of Bumbuna +Markedly improved electricity supply to most parts of Sierra Leone	0.4	0	0.4	Bumbuna PIU	2008	
Review of Power sector Master plan study	To provide updated information on the power sector		+Enhanced energy planning for Sierra Leone	0.2	0	0.2	NPA	2006	
Rehabilitation of Electricity House	To cater for the office needs of a restructured power sector		+Enhanced working environment and Improved productivity of NPA staff	1.5	0	1.5	NPA	2006	
Institutional support to the Ministry of Energy and Power	To make for a more effective Ministry to supervise a restructured power sector	+ Projects as per Reform programme mainly to set up technical wing in Ministry	+Better supervision and coordination of energy sectors	2.0	1.0	1.0	MEP	2004	WB is sponsoring initial phases of project
Support for Energy Reform measures	To implement reform measures successfully	+ Projects as per Reform programme -Sector policy, Electricity Act etc. + Implementation of schemes Energy Policy and Planning Unit, rehabilitation of infrastructure, capacity building, IPP transactions	+Enhanced and efficient operation of power sector for entrance of Strategic partner for NPA into sector	37	19.5	17.5	MEP/NPA	2004	WB has already committed \$19.5 m for reform measures

Project	Objective	Activities	Key performance indicators	Funding required US\$ m	Funding available US\$ m	Funding remaining US\$ m	Implementing Ministry/ Agency	Project start Date	Comments
Study to consolidate the Energy sectors	To result in better coordination of the energy sectors in order to have a more effective sector management		+Achieving reform and consolidation of the energy sub sectors	0.2	0	0.2	MEP/NPA	2005	
Energy efficiency studies and programmes	To result in more efficient use of energy resources	Studies and programmes for energy efficiency in all energy sub sectors. This will include improvement in charcoal production, improved stoves etc.	+More efficient use of energy resources resulting in marked improvements in conservation of energy	2	0	2	MEP	2006	
Studies and implementation of environmental programmes related to energy production	To result in better environmental practices in the energy sector	Miscellaneous environmental programmes	+Better environmental practices in all the energy sub sectors	1	0	1	MEP	2006	
Institute safety standards for household appliances, industrial appliances, commercial buildings etc	To result in safer applications of electricity for various uses	+Draw up safety codes	+Safer utilization of electricity resulting in lower accident rates	0.5	0	0.5	MEP	2006	
Set up Rural Electrification Agency and Rural Electrification Fund.	To result in more effective planning and allocation of resources specifically for rural electrification programmes	+Enact law to set up Rural Electrification Agency and Rural Electrification Fund +Set up Rural Electrification Agency +Set up Rural Electrification Fund +Implement Rural electricity programmes	+Higher access to electricity by rural population	5	0	5	MEP	2006	Only 0.5 m needed to set up Agency. Rest is money to implement some Rural electricity programmes

Project	Objective	Activities	Key performance indicators	Funding required US\$ m	Funding available US\$ m	Funding remaining US\$ m	Implementing Ministry/ Agency	Project start Date	Comments
Strengthen planning units within Energy sub sectors	To result in better information gathering and coordination with central energy unit within MEP	+Capacitate units in terms of logistics and manpower	+ Better coordination and planning of all energy activities	1	0	1	MEP	2006	
Support for Energy unit within University of Sierra Leone	To support unit that will provide miscellaneous technical support for energy activities	+Provide support to set up unit and capacitate unit	+Improved access to energy consulting services and energy service providers in Sierra Leone	1	0	1	USL/MEP		
Set up National Energy Coordinating Unit	To have a central policy, planning and coordinating unit in Sierra Leone to independently coordinate all energy matters	+Provide support to Technical unit within MEP that will ultimately form the core of this unit +Provide logistics and general support for this unit	+ Better coordination and planning of all energy related activities	2	0	2	MEP	2008	
Total				89.3	20.5	68.8			

## Household Energy Sub Sector-biomass/Renewable Energy/IPG

Project	Objective	Activities	Key performance indicators	Funding required US\$ m	Funding available US\$ m	Funding remaining US\$ m	Implementing Ministry/ Agency	Project start Date	Comments
Project to make LPG use more pervasive	To result in better utilization of modern means of energy supply	+ Investigations +Awareness programme +Intervention measures	+More pervasive use of LPG	1.5	0	1.5	MTI/MEP	1996	This includes support for petroleum companies importing LPG and support for marketers
Set up central body to regulate use of RET equipment and formulate new codes for operation of RETs	To result in proper usage of RET equipment	+ Support the setting up of this unit within the MEP	+ Greater awareness of potential of RETs and enhanced usage of RETs	0.5	0	0.5	MEP	1996	
Promote the use of Renewable energy and Renewable Energy Technologies	To result in more pervasive use of RETs in appropriate circumstance	+ Support for various awareness raising programmes	+ More pervasive and proper use of Renewable energy and Renewable Energy Technologies	0.5	0	0.5	MEP	1996	
Promotion of improved stoves programmes	To result in the manufacturing of more efficient stoves and their acceptance by users	+Support for research work on improved stoves +Support for schemes to manufacture and sell improved stoves +Awareness raising programmes	+ More pervasive use of energy efficient improved stoves	1	0	1	MEP/MAFFS	1996	
Regulation of operations of wood sellers, charcoal sellers and improved stoves manufacturers and sellers	To have a regulatory agency to regulate the activities of wood sellers and charcoal sellers	+ Set up agency to register and regulatory wood sellers and charcoal sellers	+ Proper operation of all woodselling and charcoal selling and production activities	0.2	0	0.2	MEP/MAFFS	1995	
Support for miscellaneous conservation and reforestation programmes	To help conserve scarce forest resources	+Support for various programmes in MAFFS	+ More prudent utilization of forest resources	1	0	1	MAFFS	1996	
Total				4.7	0	4.7			

## Petroleum Sub Sector

Project	Objective	Activities	Key performance indicators	Funding required US\$ m	Funding available US\$ m	Funding remaining US\$ m	Implementing Ministry/ Agency	Project start Date	Comments
Set up Regulatory agency for Petroleum sector	To result in a better regulated sector with market economic considerations	+Support regulatory functions of Petroleum Unit	+Enhanced operation and regulation of petroleum sector	0.5	0	0.5	MTI/PU	1995	Functions already being carried out by PU-Need to enhance PU's capacity
Setting up of strategic stocks of petroleum products	To allay problems of fuel shortages and cater for emergencies		+Elimination of fuel shortage problems	8	0	8	MTI/PU	1997	
Formulate New Act for the operation of the Petroleum sector	To result in better overall operation of Petroleum sales and marketing sector	+ Drafting of new Act +Enactment by Parliament	+Better operation of sector	0.25	0	0.25	MTI/PU	1995	Legislation being drafted
Assistance to monitoring units within MTI	To enhance the Ministry's capacity for monitoring all fuel related matters	+ Support for various capacitation programmes	+ More effective operation of petroleum sector	0.5	0	0.5	MTI	1995	Support can be spread out over 5 years
Initiate study for the economic viability of the Petroleum refinery	To enable GOSL to make an informed decision on the advisability of having a refinery in Sierra Leone	+Carry out relevant study	+Better planning for petroleum sector	0.25	0	0.25	MTI	1996	
Total				9.5	0	9.5			