

**REPUBLIC OF LIBERIA**



**DRAFT RENEWABLE ENERGY AND ENERGY EFFICIENCY  
POLICY AND ACTION PLAN**

**MINISTRY OF LANDS, MINES & ENERGY  
MONROVIA, LIBERIA**

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## **ACRONYMS AND ABBREVIATIONS**

CBL	Central Bank of Liberia
CSET	Center for Sustainable Energy Technology
ECOWAS	Economic Community of West African States
GDP	Gross Domestic Product
LDC	Least Developed Country
LEC	Liberia Electricity Corporation
LPG	Liquefied Petroleum Gas
LPRC	Liberia Petroleum Refining Company
MDGs	Millennium Development Goals
MLME	Ministry of Lands, Mines and Energy
MPEA	Ministry of Planning & Economic Affairs
NACUL	National Charcoal Union of Liberia
NEC	National Energy Committee
PV	Photovoltaic
R & D	Research & Development
REEEP	Renewable Energy & Energy Efficiency Partnership
RE & EE	Renewable Energy & Energy Efficiency
RE	Renewable Energy
REA	Renewable Energy Agency
RET	Renewable Energy Technology
UN	United Nations
WSSD	World Summit on Sustainable Development

## **1.0 INTRODUCTION**

### **1.1 Background**

Studies on renewable energy resources undertaken prior to the civil war revealed that Liberia has abundant renewable energy resources such as biomass, hydro, solar and wind, but they are yet to attract private investment. A key barrier to private investment in renewable energy and energy efficiency in Liberia is the lack of appropriate policy and regulatory frameworks for the sector.

In her keynote address at the opening session of the National Energy Stakeholders' Forum held in October 2006, President Ellen Johnson-Sirleaf stated emphatically that her Government is committed to increasing access to energy services for its rural and low-income population. In this regard, the Government will consider various institutional models based on best practices in order to develop and ensure that our policy of poverty alleviation is fully supported through the provision of sustainable energy services to rural and low-income consumers.

Thus increasing access to energy services in rural and low-income communities will require substantial inputs from the renewable energy sub-sector. This means identifying those issues and formulating policies that are relevant to attracting private capital to the renewable energy sub-sector.

The international financial community has significant capital available for investment in renewable energy projects. But an increasing number of countries are vying for this capital. To be competitive in this situation, Liberia will first have to demonstrate a legal, regulatory, political and commercial environment that reduces risk and provides investors with good reason to believe they will receive a fair and reasonable rate of return on their investment.

This policy therefore seeks to create an environment in which the private sector shoulders the task of developing and moving the country's renewable energy sub-sector forward by bridging local barriers which impede the development of renewable energy resources through private investment.

### **1.2 Purpose**

The purpose of this document is to produce a national policy instrument to build and increase the application of renewable energy and energy efficiency technologies in Liberia by promoting investment, technology transfer, market development and local capacity building. Given the uneven economic advantage that conventional energy sources have over renewables, this document will make the energy sector competitive by facilitating Government support, private sector investment/lending, increased investment in off-grid rural electrification, indigenous energy technologies and training to build local capacity in order to deal with renewable energy issues.

### 1.3 Geographic and Demographic Frame

Liberia is situated on the southwest corner of the West Coast of Africa between longitude 7°30' and 11°30" west and latitude 4°18' and 8°30' north. The country is bounded on the south by the Atlantic Ocean, on the east by Côte d'Ivoire, on the north by the Republic of Guinea and on the west by the Republic of Sierra Leone. Liberia covers an area of 111,370km<sup>2</sup>. Water covers 15,050Km<sup>2</sup> and the remaining 96,320km<sup>2</sup> is covered by land. Total land boundaries extend to 1,585 kilometers - Guinea 563 kilometers, Côte d'Ivoire, 716 kilometers and Sierra Leone 306 kilometers. Liberia's coastline stretches about 563 kilometers. Liberia has not conducted any National Population and Housing Census since 1984. As a result, current figures are based on estimates and projections from last census. Generally it is estimated that the current population of Liberia is at least 3 million.

Table 1: Estimates of Key Demographic Indicators

Total Population	3 million
Urban Population	46%
Rural Population	54%
Sex Ratio	1:1
Dependency Ratio	80%+
Total Households	600,000
Average Household Size	5

Source: MPEA, Liberia

### 1.4 Socio-economic Situation

Liberia is classified among the least developed countries (LDC) with a dualistic economy. Much of its previous minimal development which took place along the coast and in concession areas has been destroyed as a result of the fourteen year civil war. The economy is struggling to resuscitate in the midst of the lack of basic social services and infrastructure. Both income and human poverty are among the highest in sub-Saharan Africa. In this embryonic stage of Liberia's post-war reconstruction and development, the challenges are enormous amongst which is the rehabilitation of the energy sector, one of the key inputs to poverty reduction and the realization of the MDGs.

Table 2: Key Indicators

Indicator	Value	Year
Population	3 million	2005
Population growth rate	2.4%	1996
Life expectancy at birth	47.7yrs	1999/2000
GDP per capita (US\$ and PPP\$)	151.02	2003
External debt (USD) as % of GDP	707.8%	2003
Income poverty (population with < \$1/day/person)	76.2%	2001
Human poverty Index (HPI-1)	53.1%	1999
GDP per unit energy use (as proxy for energy efficiency)	5.55KWh	2001

Source: MPEA, Liberia

## 2.0 CURRENT STATE OF LIBERIA'S RENEWABLE ENERGY SUB-SECTOR

### 2.1 Renewable Energy Resources

Liberia has enormous renewable energy potential. Studies on alternative energy sources indicate that the country is endowed with biomass, hydro and solar resources that could be developed to meet some critical energy needs across the country. While there is no current data on wind speed across the country, observation along the coastal regions shows good prospect for the development of wind power.

However, the prolonged civil war and insecurity in Liberia has hindered the development of renewable energy systems, with harmful effects on social and economic development across the country. Despite this, the role of renewable energy services as a major input for survival and socio-economic activities has not been recognized for a long time in Liberia.

**Table 3: Current Status of RE & EE in Liberia**

Key Issues	Current Status
Existence of National Energy policy and/or Action Plan	No
Defined Long-term Target for RE in energy supply mix	No
Technology Target(s)	No
Current inventory of RE Resources	No
Evaluation of RE utilization rate	No
Regulatory and Market/economic incentives for REs	No
Identification of key barriers to RE dissemination	No
Identified, targeted, research & development and technology transfer programs for REs	No
Improved energy efficiency in all productive sectors and reduce expenditure	No
Environmental Objectives for RE & EE – <i>i.e. Climate change and mitigation of Green House Gas emissions</i>	No
Integration of RE & EE in PRSP	No
Identification of potential applications for RE & EE	yes

#### 2.1.1 Biomass

In Liberia, as in nearly all of Sub-Sahara African countries, woody biomass is the primary energy source used for domestic cooking and heating. Rural inhabitants and the poor account for a large proportion of firewood and charcoal use in the country. According to the Central Bank of Liberia (CBL), a total of 14,800 kilograms of charcoal was produced in 1998. The CBL reported that charcoal production increased to 255,600 kilograms in 1999 with about 90% of households using firewood and charcoal as an energy source<sup>1</sup>.

Latest data obtained from the National Charcoal Union of Liberia (NACUL) in 2005 shows that charcoal production in Liberia now stands at 36,500,000kg (36,500 tons) per annum. There are no firm data on firewood consumption in Liberia, but findings from a survey conducted by CSET in 2004 indicate that scarcity of firewood is becoming a serious problem in most parts of Liberia, especially in Montserrado County.

<sup>1</sup> Department of Energy, Ministry of Lands, Mines & Energy, Republic of Liberia, Unpublished Energy Sector Report (2002), p-16.

Nationally, Liberia is harvesting well above the level that can be sustained annually without depleting the current stock and degrading the environment. Annual consumption of firewood in rural Montserrado County is estimated at 18m<sup>3</sup> per household. Forecast for the country estimates an annual increase in demand of about 0.6m<sup>3</sup> per household. The impacts of firewood shortages in Liberia need to be researched extensively so as to formulate policy that would protect future generations. Without such policy, demand and consumption for charcoal and firewood will continue to grow in the absence of electricity and energy efficiency measures. The use of woody biomass as a source of energy will increase in relation to rural population growth and poverty. If this demand is not met in a sustainable manner, it will eventually lead to deforestation, environmental degradation and probably desertification in Liberia. Besides the issue of natural forest depletion, the production and consumption of woody biomass is inefficient. Hence, there is need to improve on the efficiency of production and consumption of woody biomass.

### **2.1.2 Hydro**

Liberia has considerable potential for hydroelectric power. At the onset of civil war there were three (3) operational hydroelectric power plants in Liberia: Harbel (Firestone), 4MW; Mount Coffee (LEC), 64MW; and Yandahun (a community micro hydro in Lofa County), 30KW. The Mount Coffee and Yandahun plants were destroyed during the war, but the Harbel plant is still operational.

A number of feasibility studies were carried over the period 1976-1983. At least 14 large-scale schemes were identified in over six (6) main rivers. The Cavalla River has a single largest potential (225MW at Tiboto) but with more than half of this in Cote d'Ivoire, bilateral cooperation is required for its development. Similarly, the Mano River, with the potential of up to 180MW, has nearly a quarter of its basin in Sierra Leone<sup>2</sup>. However, since four (4) of the six river basins are within Liberia's borders, they could be developed. The major drawback is that all suffer from the problem of low-head flow, requiring huge investment in storage or reservoir to maintain firm capacity during the dry season. About 24 other sites have been identified for small hydroelectric schemes (up to 5 MW). In 1988, the Liberia Electricity Corporation (LEC) sought investment capital to develop six mini hydro schemes with total installed capacity of about 20 MW, which was intended to supply three (3) rural grids serving 14 major population centers in the northern half of Liberia.

### **2.1.3 Solar**

Although Liberia has high rainfall, annual solar insolation shows good prospects for the application of solar technologies such as photovoltaic and solar thermal for health, education, agriculture and micro-enterprises. Despite the lack of national data on solar resource in Liberia, global weather data obtained from RETScreen International of Canada and the National Renewable Energy Laboratory of the US Department of Energy show that monthly average daily solar radiation on horizontal surface in Liberia is between 4.50 to 6.0 kWh/m<sup>2</sup>/day<sup>3</sup>.

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<sup>2</sup>Department of Energy, Ministry of Lands, Mines & Energy, Republic of Liberia, Unpublished Energy Sector Report (2002), p-17.

<sup>3</sup>Global Solar Resource Map, NREL International Programs Brochure, P-7, and Online Global Weather Data for RETScreen International Photovoltaic Project Analysis.

## **2.1.4 Wind**

Although Liberia is situated in a low wind region, there is no current data on wind speed across the country. However, direct observation along the coastal region shows good prospect for the development of wind power. Notwithstanding, there is a need for intensive wind resource assessment along the coast and inland.

## **3.0 THE FUTURE OF LIBERIA'S RENEWABLE ENERGY SUB-SECTOR**

### **3.1 Poverty Reduction Strategy and the Role of Renewable Energy**

Poverty in Liberia is pervasive. However, the poor are primarily found in the rural areas (86%)<sup>4</sup>, among households engaged in subsistence farming as their main source of livelihood. The majority of farmers are women, and farming methods rudimentary. The protracted civil war exacerbated poverty throughout the country and at all level of society, including small-scale entrepreneurs, technicians, traders, and professionals (teachers, engineers, nurses and students). As a result, many people, who once lived above poverty line (US\$1.00 per person per day), must now suffer and try to survive below it. This may be exacerbated by the lack of sustainable, adequate and affordable energy services which could be obtained from renewable sources.

Energy services influence people's lives, especially the poor. It is essential to almost all aspects of human welfare, including access to water, agricultural productivity, healthcare, education, employment, and environmental sustainability. Nonetheless, hundreds of thousand of households in Liberia still lack access to safe and reliable energy services and pay high prices for poor-quality substitutes.

Considering heavy reliance on conventional energy source (particularly fossil fuel) in Liberia, the cost of which is high and subject to external shocks, Poverty Reduction Strategies must consider the role of renewable energy sources in the energy supply mix so as to increase access to energy services.

### **3.2 Renewable Energy Access, ECOWAS Initiative and the MDGs**

Access to conventional energy services in Liberia is driven by petroleum products (fossil fuel), which is insufficient, relatively expensive and skewed in favor of the urban population mainly in the Monrovia area. Also the bulk of the population, mainly in the rural and peri-urban areas, inefficiently uses traditional biomass because of easy access to the forest, and lack of appropriate policy and programs to address their energy needs. Therefore, the strategic focus for increasing adequate and affordable nationwide access to energy services could be the use of renewable energy sources.

In October 2005, the ECOWAS Ministers in charge of energy adopted a regional policy on access to energy services for populations in rural and peri-urban areas for poverty reduction in line with achieving the Millennium Development Goals. This initiative is complementary but not restricted to the development of infrastructure for increasing the provision of energy and reducing the costs of production. It is a pro-poor strategy which specifically tackles and addresses the issue of access to energy services. It presupposes that the primary importance for poor people is affordability, reliability and accessibility of energy services, not the source of energy itself. It notes that energy is a means not an end to achieving sustainable development and the mere availability of energy is not

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<sup>4</sup> Ministry of Planning and Economic Affairs, Liberia

enough. Therefore it must be transformed into tangible energy services to improve people's life, i.e. cooking, lighting, heating, motive power etc.

In September 2000, at the United Nations Millennium Summit, world leaders agreed to a set of time-bound and measurable goals and targets for combating poverty, hunger, illiteracy, gender disparity, disease, environmental degradation and foster global partnership. The eight goals that were eventually agreed upon are what the development community now refers to as the Millennium Development Goals (MDGs). While there is no MDG specifically on energy, access to energy services is a prerequisite to the achievement of all eight MDGs. This was recognized at the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002. Unfortunately, much greater quantity and much greater quality of energy services through renewables will be required to meet these goals in post-conflict Liberia. To ensure that a lack of adequate energy services does not become a bottleneck to achieving the MDGs in Liberia, urgent actions are needed to move beyond the 'business-as-usual' approach to energy in the country.

Given the constraints posed by the use of conventional energy source (fossil fuel) and the inefficient use of traditional biomass, the vision for the renewable energy sub-sector is to ensure secure, reliable, adequate, affordable, efficient sustainable and market-oriented energy services for all Liberians through renewable sources. Considering the uneven economic advantage that conventional energy sources have over renewables, this vision will make the renewable energy sub-sector a major competitor in the energy sector through:

- Fostering Government support to RE & EE scale-up.
- Private sector investment/lending in RE & EE sector.
- Increasing investment in off-grid rural electrification through the deployment of renewable energy technologies.
- Promoting indigenous energy technologies that demonstrate clear cost advantage without jeopardizing quality.
- Training to build local capacity to deal with RE issues.

#### **4.0 KEY CHALLENGES AND ISSUES IN THE RENEWABLE ENERGY SUB-SECTOR**

There are several challenges facing the renewable energy sub-sector of Liberia. The key challenge is the Government's inability to increase access to modern energy services for the majority of Liberians. The Liberian Government is confronted with the challenge of ensuring that the citizenry have access to clean, efficient, reliable, and affordable energy services in this post-war era. This challenge is particularly acute for rural areas and for low-income households and communities where population density, distance, security, and resource availability raise costs above local ability or willingness to pay.

##### **4.1 Policy Issues**

Policy-making is an important function of government, whose role is to ensure that effective measures are instituted for formulating and implementing comprehensive policy based on sound information. Policy matters on energy issues are under the jurisdiction of the Ministry of Lands, Mines and Energy (MLME). The Ministry has a broad mandate which include for the purpose of this document the following:

- To coordinate, explore, exploit and enhance the production of hydrocarbon activities in Liberia.
- To supervise, coordinate or conduct research in developing conventional alternatives, new or renewable energy sources.
- To promulgate all regulations affecting Lands, Mines and Energy in Liberia.
- To monitor compliance with, as well as enforce all laws and regulations affecting Lands, Mines and Energy in Liberia.
- To formulate, in conjunction with relevant ministries and Agencies, and in accordance with prevailing conditions and national requirements, a comprehensive national energy policy for submission to the Government of Liberia.

Being at senior policy level with the overwhelming mandate outlined above, the Department of Energy of the Ministry has been very dormant over the past fifteen years. As a result, the Department has not been able to adequately perform its statutory mandate and cope with the demands of the different strategic components of sustainable energy systems and changing energy technologies around the world. However, having realized the pivotal role that energy plays in the development process, the Government of Liberia in collaboration with its international partners hosted a National Energy Stakeholders' Forum in October 2006. Proceedings from this forum resulted into a draft "White Paper" which will eventually lead to the formulation of a National Energy Policy and Master Plan for Liberia.

## **4.2 Legal and Regulatory Issues**

Framework for legal and regulatory activities of the energy sector of Liberia is uncoordinated and weak. This is because there is no defined energy policy and regulatory framework that would serve as a roadmap for making the energy sector viable and responsive to the needs of the populace. Furthermore, the energy sector is fragmented with no proper coordinating mechanism. Therefore, the setting up of a National Renewable Energy Authority will help overcome some of these barriers.

## **4.3 Institutional Issues**

The National Energy Committee (NEC), established by the government of Liberia in 1984 has been dormant due to the civil war. This has created major institutional problems for Liberia's energy-related planning and decision making. Energy-related decisions are scattered among many public and private sector institutions. Often all of them pursue their own policies with very little coordination and consideration of the effects of their policies on each other and the country as a whole. Ideally, a single energy planning authority should determine overall energy policy, and coordinate it with overall economic and social policies. A stepwise approach in organizing the energy sector may often be useful. For example, a renewable or non-conventional energy authority or commission serving as representative of all renewable energy supplies and major users has been absent. Furthermore planning and policy making for renewable energy data collection and analysis has been non-existent. If the advantages of coordinating policy become evident, the Ministry of Lands, Mines and Energy could have a degree of control ranging from the establishment of policy guidelines to directing and controlling the renewable energy sub-sector. The lack of this mechanism in Liberia has been one of the major barriers to renewable energy development in the country.

#### **4.4 Environmental Issues**

Energy can strengthen efforts to achieve socioeconomic development and ambitious goals such as the MDGs, but it can also harm human health and the environment if it is not efficiently and sustainably produced and used. Conventional energy sources emit greenhouse and other noxious gases as well as suspended particulate matter and oil waste.

Though their level of pollution in Liberia is practically negligible, there is a need to integrate renewable energy technologies and services into the overall national energy supply mix so as to mitigate future environmental problems given the growing population and energy demand and consumption.

In addition, the inefficient use of traditional woody biomass by over 90% of the country's population continues to pose environmental threats and health problems through deforestation, indoor air pollution, and the build up of carbon dioxide in the atmosphere. Therefore, the efficient use of traditional biomass through the application of renewable energy technologies will significantly help reduce the environmental impact emanating there from.

#### **4.5 Gender Issues**

Gender issues are not a “women’s only thing” or sole concern of women. They are everyday societal issues, which affect both men and women in their daily interactions as they strive to build a better and more prosperous society for themselves, their families and their communities. These have made gender issues to become a global concern.

In 1995, the UN’s Fourth World Conference on Women, held in Beijing, concluded that throughout the world women continue to have fewer options and opportunities than men. Unequal treatment of men and women, and their differentiated social and economic roles, has also led to higher levels of poverty for women than for men in many countries. This situation is glaring in Liberia. Achieving gender equity is an important reason for attention to women’s needs. MDG 3 talks about “*Promoting Gender Equality and Women’s Empowerment*”. In order to achieve this goal, the distinct energy concerns of women need to be addressed through gender sensitive energy policies and programs in Liberia.

As a starting point for gender-sensitive energy policy making, it is important to identify the renewable energy services of primary importance to women and to consider options for providing those services. Energy planning in Liberia has often focused on increasing supplies of fuel or electricity, especially for individuals and urban uses, with little attention to energy demand characteristics of women – mainly those in underserved or unserved rural areas. Rural energy needs for domestic, agriculture and small scale informal production activities where women predominate have been given low priority in Liberia. As a result, gender concerns continue to remain at the margin of energy project planning and decision-making.

Development strategies of Liberia treat energy only within the context of large-scale infrastructure projects. Energy access issues are conspicuously absent, leaving important linkages with productivity and cross-sectoral applications unaddressed. This trend can be attributed to the lack of adequate knowledge of the gender dimension of energy planning because women are often not consulted in the planning process. There is a need to take gender into account in energy projects because men and women use

energy for different things. Therefore, their needs and appreciations of any particular energy intervention may be different. It is important to serve everyone adequately. Any change such as the introduction of a new technology is likely to be experienced differently by men and women.

#### **4.6 Investment and Market Development Issues**

Liberia's huge debt burden and longstanding unattractive investment climate has been the major barrier to investment and market development in the renewable energy sub-sector. With the destruction of energy infrastructure by the war, increasing energy access with renewable sources will require massive capital infusion. Even if smaller-scale, modular renewable energy and energy efficiency projects are considered as complements for remote and distant communities in Liberia, the high up-front capital costs and long-term payback period is unattractive to private investors. Generally, the banking sector disregards renewables and energy efficiency on the conception that either they do not provide sufficient and rapid returns on investment or the renewable energy sector is a new and emerging technology in Liberia. To increase investment in renewable energy and energy efficiency, more innovative financing mechanisms and repayment schedules will be necessary with the following actions:

- Awareness about financing market-based renewable energy services within and between existing financial institutions will help free-up funds, increase investment and develop market;
- Building capacity and increasing the experience of renewable energy and energy efficiency project implementation will enhance financing;
- Success stories about financing models for renewable energy project implementation should be shared more widely and used to leverage funds from multilateral financial institutions such as the African Development Bank, World Bank, International Finance Corporation, etc;
- Financiers should expand their focus and build knowledge and experience of post-conflict countries such as Liberia; and
- Addressing Liberia's external debt arrears can also provide the possibility for loan to develop the renewable energy sub-sector.

Hence, the development of renewable energy market in Liberia will require massive public awareness and information dissemination programs on the use of renewable energy technologies through demonstration projects targeted at improving social and economic activities. This will require the formulation of appropriate policy and program by the Government in order to overcome the investment and market development barrier.

### **5.0 RENEWABLE ENERGY AND ENERGY EFFICIENCY POLICY**

#### **5.1 Policy Goal**

The goal of the renewable energy and energy efficiency policy is to provide an input into the development process by exploiting Liberia's renewable energy resources to attract investment, development market, transfer technology and build local capacity in the renewable energy sub-sector in an environmentally sound manner and with due regard to gender issues. A major aspect in achieving the above goal is factoring renewable energy services into overall national economic and social development agenda, including poverty reduction strategies and MDG campaigns.

## **Policy Statement**

The Government of Liberia is committed to ensuring an environment conducive for providing accessible, reliable, affordable, adequate and efficient renewable energy services that are socially and environmentally acceptable which will be a key ingredient in the fight against poverty and the quest to achieve the MDGs and sustainable development in Liberia.

### **5.2 Key Principles**

The renewable energy and energy efficiency policy will be based on the following key principles:

- (a) Renewable energy services are accessible - this implies that the infrastructure for supply of RE is extensive such that is easily procured by any person or institution when needed.
- (b) Renewable energy services are reliable so as to meet all demands at any particular time far into the future;
- (c) Renewable energy services are affordable with the view of improving the living condition of the populace, especially the poor;
- (d) Renewable energy is produced and supplied in an acceptable form so that its production, supply and use have no adverse health and environmental impact; and
- (e) Renewable energy is used in the most efficient manner.

### **5.3 Resource Development, Technology and Supply Policy**

#### **5.3.1 Resource Development Policy**

The main objective of the renewable energy resource development component of the policy framework is aimed at ensuring supply availability and self-sufficiency. To achieve this aim, the strategic issues that are addressed under the policy are:

- Expanding the exploitation and development of renewable energy resources – biomass, hydro, solar and wind;
- Securing renewable energy supplies for the future.

In order to expand the exploitation and development of RE resources, the policy action is expected to focus on the following:

#### ***Biomass***

- Support sustained regeneration of woody biomass resources, and use of human wastes and dung for energy; and
- Create viable and domestic market for biomass-based alternative fuels through regulations, financial intermediation and pricing incentives.

#### ***Hydro***

- Support the development of the largely untapped hydropower resources of the major rivers in the country;
- Support the development of micro and mini hydropower resources across the country.

## ***Solar and Wind***

- Support the exploitation and use of solar and wind resources through creation of favorable regulatory and fiscal regimes and attractive pricing incentives.

### **5.3.2 Technology Policy**

This policy will focus on technology transfer programs that encourage local production of end-use equipment that take into consideration cost effectiveness, standard and environmental sustainability. It will further provide a condition that keeps the RE sub-sector abreast of renewable energy technology evolution in order to take advantage of new developments that allow expansion and exploitation of Liberia's renewable energy resources.

### **5.4.3 Supply Policy**

The RE supply policy will focus on ensuring general access to and reliability of supply of renewable energy services. The strategic issues to be addressed under the RE supply policy are the following:

- Increasing access to renewable energy services; and
- Attracting investment required to consolidate, expand, and modernize renewable energy production and supply infrastructure.

### ***Increasing Access to Renewable Energy Services***

Access to energy forms such as electricity and petroleum products is insufficient and limited to a small proportion of the urban population. The main concentration for achieving general access will be to provide renewable energy services to all Liberians, especially peri-urban and rural populations. Therefore, the following objectives must be pursued:

- Support public-private partnership in the RE sub-sector;
- Increase funding for rural electrification;
- Subsidize RE service delivery in rural areas;
- Support decentralized off-grid rural electrification with RETs using solar PV, wind, mini/micro hydro and biomass;
- Support the implementation of productive uses of electricity as an integral part of rural electrification;
- Support the use of cleaner fuel such as LPG and biogas to substitute wood fuel use in homes and small businesses;
- Address institutional and market constraints that hamper increasing access to renewable energy services;

### ***Consolidation and Expansion of RE Production and Supply Infrastructure***

Liberia has a great potential for RE supply. The focus of this policy is to attract investments in order to set up, consolidate and develop the capacity for scale-up services in the RE sub-sector. In order to achieve the above, the following points must be pursued:

- Secure increased private sector investment in partnership with the public sector for capitalization and expansion of all aspects of RE supply infrastructure;
- Seek foreign/donor financing for capacity building and developing renewable energy infrastructure;
- Support mobilization of domestic capital sources to supplement external funding for renewable energy sub-sector infrastructure and operations;

## **5.5 Consumption and Demand Management Policy**

Liberia has very low per capita modern energy consumption. About 95% of energy consumption is met from traditional biomass, which is inefficiently used. This policy is intended to address the following issues:

- Managing growth in consumption/demand and ensure efficiency in renewable energy supply and use;
- Minimizing environmental impact of energy use;

### **5.5.1 Managing Growth in Consumption and Demand**

The energy sources demand and consumption patterns of Liberia are closely related to the social and economic characteristics of the country. Factors as diverse as unemployment, natural resource exploitation, population growth, demography, agricultural practices, governance, security, illiteracy, and poverty play a major role in the energy and development nexus.

#### ***Woody Biomass***

Supply sources and consumption patterns for domestic energy in Liberia show heavy reliance on woody biomass both in rural and urban areas. Annual consumption of firewood in rural Liberia is about 18m<sup>3</sup> per person. With a population growth rate of about 2.4%, the demand for firewood is expected to increase in Liberia. Forecast for the country estimates an annual increase in demand of about 0.43m<sup>3</sup> per person. The impacts of firewood shortages in Liberia need to be researched extensively so as to formulate policy guidelines for future demand, consumption and efficiency measures.

#### ***Hydro***

Liberia hydro potential has not been fully exploited to meet energy demand in the country. Government therefore will institute policy measures that will promote the development of the vast and proven hydro potential so as to meet future energy consumption and demand.

#### ***Solar and Wind***

Government will introduce measures that will encourage public-private partnership for solar and wind resource assessment and development in order to diversify the energy supply mix to meet growing energy demand.

In view of all of the above, Government will pursue the following in order to meet rising energy demand and consumption:

- Establish appropriate pricing regime for renewable energy services incorporating appropriate instruments that would encourage and provide incentives for the management of energy consumption;
- Support a sustained and comprehensive public education and awareness building campaign to teach energy consumers the methods and benefits of energy conservation; and
- Promote the use of improved wood fuel burning equipment for cooking in households and other commercial activities, as well as discouraging the use of inefficient energy consumption methods.

## **5.6 Investment and Market Development Policy**

### **5.6.1 Investment Policy**

The aim of the renewable energy sub-sector investment policy is to create conducive environment in order to promote private sector investment. The main issue to be addressed is how to mobilize investments needed to finance the RE sub-sector

infrastructure. This policy is therefore intended to encourage both domestic and foreign private sector investment by providing appropriate fiscal and financial incentives and creating a proper legal and regulatory environment.

Hence, in order to increase the role of private sector investment in the provision of RE supply infrastructure and services, the following points must be considered:

- Encourage financing through the banking system and other private sectors;
- Provide selective sovereign guarantees for RE projects of strategic importance;
- Provide fiscal and financial incentives for the development of the renewable energy sub-sector; and
- Put in place and implement administrative and regulatory measures that would attract private sector investment.

### **5.6.2 Market Development Policy**

The market development policy intends to create and expand market for RE services and end-use equipment across Liberia. The strategic focus of the RE market development policy is to build effective demand for RE services and end-use equipment locally.

Traditionally, pricing of commercial energy forms (mainly electricity and petroleum products) have been vested in the regulatory agencies (LEC LPRC and the Ministry of Commerce). In this Market Development Policy of the RE sub-sector, Government intends to reduce in the medium term and to eliminate in the longer term, the application of national budgetary resources to subsidize energy services except in strategically critical cases. Therefore, Government intends to:

- Support implementation of cost recovery pricing of energy services with selective subsidy principles to address specific national development objectives; and
- Provide special rates for the vulnerable in society (life line tariffs) and also protection of production activities that have the potential to generate significant indirect economic benefits (employment or income generation) etc.;

## **INSTITUTIONAL AND HUMAN RESOURCE DEVELOPMENT POLICY**

### **5.7.1 Institutional Development Policy**

The Goal of the institutional development policy is to build a strong RE sub-sector institution operating in an environment that ensures high level of independence and/or minimal Government interference.

With the creation of competitive markets, the objectives for the development of an effective institutional framework for the RE sub-sector will be to:

- Establish a Renewable Energy Agency (REA) through legislation that will serve as the regulatory arm of the RE sub-sector;
- Conduct and rationalize the regulatory framework for RE resource exploitation and distribution by enacting appropriate legislations that will control the exploitation of RE resources;
- Focus on intensive regulations required to move the regulatory environment forward in achieving improved service delivery;
- Manage a regulatory framework that encourages private sector investments and minimizes direct Government involvement in the regulation of the RE sub-sector operations;
- Promote market oriented management approach in publicly owned RE sub-sector companies and utilities and help strengthen their financial capacity;
- Support private sector involvement in the provision of RE infrastructure and services; and
- Build a regulatory environment which provides an investment climate that affords both domestic and foreign investors a level playing field in the RE sub-sector;

### **5.7.2 Human Resource Development Policy**

In order to develop the RE Sub-sector, a strong human resource capacity is required, especially in technology and Management. Adequate capacity in RE policy analysis, project management and monitoring will foster the rapid development and implementation of RE Sub-sector programs and projects. Therefore, the main aim of this policy is to develop adequate human resource capacity in the development of the sub-sector.

In view of this, the Government of Liberia will prioritize the training of Liberians in all relevant areas of RE development, financing and management. The Government will also build capacity in indigenous manufacture and development of RE technologies and end-use equipment.

### **5.7.3 Research and Development Policy**

It is important to note that research and development (R&D) efforts will provide opportunity to significantly build the necessary capacity in the RE Sub-sector so as to resolve emerging difficulties and provide the platform to accelerate the development of the RE Sub-sector. The focus here will be to establish RE funds from which allocations will be made for RE research and development activities. Also priority will be given to

adaptive R&D in renewable energy technologies (RETs) while promoting basic research both in the public and private sectors.

## **5.8 Energy Efficiency and Conservation Policy**

The major goal of the energy efficiency and conservation policy is to ensure the optimal use of renewable energy resources so as to maximize output at a minimized cost. This will guarantee sustainable management of energy resources and end-use technologies in terms of both demand and consumption. Thus, energy efficiency standards for appliances, large equipment and buildings must be set and enforced through monitoring of imports and local manufacturing.

Therefore, the Government intends to institute the following measures in order to achieve the above policy goal:

- Promote, through legislation, the local production and use, in all sectors of the economy of efficient energy consuming equipment, including improved wood fuel burning equipment for domestic and commercial activities;
- Remove institutional barriers hindering the use of energy efficiency and conservation technologies through appropriate legislations;
- Put in place financial and fiscal incentives including appropriate funding mechanisms and tax incentives for energy efficiency through legislation; and
- Support and actively cooperate with international organizations that seek to ensure sustainable delivery of renewable energy services to mitigate climate change.

## **6.0 POLICY IMPLEMENTATION**

### **6.1 Legal, Regulatory and Institutional Framework**

In order to implement the renewable energy and energy efficiency policy of Liberia, the Government will institute a legal regime that will provide the support for commercial transactions to take place in the RE sub-sector. This will help to remove legal, regulatory, economic and social barriers to investments in RETs and other specific sectors linked to the RE sub-sector. Clear legal and regulatory guidelines will contribute to a stable and predictable market within which the financial community (both domestic and international) feels comfortable in investing.

Therefore, a Renewable Energy Agency (REA), with statutory and legal mandate will be established through legislation to serve as the legal and regulatory body for the renewable energy sub-sector. This agency will enhance the attractiveness of the RE sub-sector so as to promote private sector investment. The REA will design and implement regulations to promote developmental investment of renewable energy resources, while simultaneously establishing reasonable standards to protect the populace and the country's environment.

## **7.0 RE & EE ACTION PLAN**

Within the context of the purpose and vision of Liberia's RE and EE Policy, the following action plan and strategy will be pursued over the next five years:

### **7.1 Goal**

The overall goal of the RE & EE Policy is to provide an input into the development process by exploiting Liberia's renewable energy resources to attract investment, market development, technology transfer and local capacity building in the renewable energy sub-sector in an environmentally sound manner and with due regard to gender issues.

### **7.2 Objectives**

To achieve the policy overall goal, the Government of Liberia main objectives are to:

1. Establish legal and regulatory framework for the development of the RE & EE sub-sector in Liberia;
2. Attract private investment to the RE sub-sector through fiscal and tax incentives;
3. Develop and expand RE market in Liberia through public-private partnership; and
4. Transfer technology and build local capacity in the RE & EE sub-sector through training.

### **7.3 Expected Results**

- Government's political, economic and financial support to the RE & EE sub-sector provided;
- Private sector investment/lending in RE & EE sector attracted;
- RE & EE market developed and expanded through public-private partnership;
- Technology (indigenous as well) transferred and local capacity built through training in the RE sub-sector.

The four expected results outlined above will contribute to the following expected impacts:

Outcome 1: Remove barriers to the development of RE & EE sub-sector and stimulate investment in the sector;

Outcome 2: Development of RE market and scale-up in the application of RE & EE technologies in Liberia;

Outcome 3: Increment in public-private partnership, increased access to renewable energy technologies and contribution to poverty reduction and achievement of the Millennium Development Goals; and

Outcome 4: National awareness and application of renewable energy technologies.

It is envisaged that the policy expected outcomes and impact would support Liberia's overarching development objective of socio-economic recovery and poverty reduction by increasing access to energy services especially among rural inhabitants and low-income population;

#### 7.4 Overall Strategy

In order to facilitate development of the RE sub-sector in Liberia, it is necessary to increase investment in this sector. The overall development objective, which will be supported by this policy Action, will require a broad range of regulatory measures and capacity-building efforts for investment and market development in the RE sub-sector.

##### ***Legal and Regulatory***

The Government will develop legal and regulatory regime and guidelines for the RE sub-sector to help ensure a stable and predictable market within which the financial community (both domestic and international) feels comfortable to invest.

##### ***Investment***

- Strategies to encourage private sector investment and lending be developed;
- Increased investment in RE & EE and off-grid rural electrification through the deployment of renewable energy and energy efficiency technologies;
- Reducing the transaction costs in investing in renewable energy and energy efficiency technologies;

#### 7.5 Capacity Building

- Building local capacity through training so as to deal with RE & EE technologies and RE project management.

#### 7.6 Indicators, Activities, Deliverables and Outputs

The RE & EE Policy implementation program objectives, indicators, activities, deliverables and outputs are as indicated as follows:

##### **RE & EE Policy Objective 1**

<b>Objective 1</b>	Establish legal and regulatory framework for the development of the RE & EE sub-sector in Liberia;
<b>Indicator</b>	Recommendation for the creation of a Rural Electrification & Renewable Energy Agency in the National Energy Sector White Paper
<b>Activity</b>	Drafting of laws to develop the renewable energy sub-sector of Liberia.
<b>Deliverable</b>	Legislation creating the Renewable Energy Agency (REA)
<b>Output</b>	Establishment of Renewable Energy Agency

### RE & EE Policy Objective 2

<b>Objective 2</b>	Attract private investment to the RE sub-sector through fiscal and tax incentives
<b>Indicator</b>	The inclusion of the RE sub-sector as a priority sector qualified for national investment incentives through the National Investment Commission.
<b>Activity</b>	More registration of RE & EE businesses
<b>Deliverable</b>	Availability of RE & EE end-use equipment and accessories on the local market
<b>Output</b>	Investment guarantee for investors in the RE & EE sub-sector

### RE & EE Policy Objective 3

<b>Objective 3</b>	Develop and expand RE & EE market in Liberia through public-private partnership
<b>Indicator</b>	Increased applications of RE & EE technologies.
<b>Activity</b>	Importation and/or manufacture of affordable RE & EE equipment and accessories
<b>Deliverable</b>	Spontaneous establishment of sales and distribution outlets for RE & EE equipment and accessories across the country.
<b>Output</b>	More sales and Distributions of affordable RE & EE end-use equipment and accessories in Liberia.

### RE & EE Policy Objective 4

<b>Objective 4</b>	Transfer technology and build local capacity in the RE & EE sub-sector through training
<b>Indicator</b>	Increased knowledge and skills in the application of RETs
<b>Activity</b>	Training of trainers' workshop and working with academic/technical institutions to integrate RET courses in their programs.
<b>Deliverable</b>	Establishment of RET training institutions and facilities.
<b>Output</b>	More trained manpower in the RE & EE sub-sector.