NATIONAL RENEWABLE ENERGY AND ENERGY EFFICIENCY POLICY (NREEEP)

APPROVED BY FEC FOR THE ELECTRICITY SECTOR

Ministry of Power

Federal Republic of Nigeria

4/20/2015

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FOREWORD

Nigeria is a country with an estimated population of 170 Million people, 65% of which are between the ages of 18 to 45 years. Only about 40% of the population has access to electricity supply. The national grid is limited in reach. There is limited extension of the grid to most communities, and it would take decades to reach most areas in Nigeria. This leaves a majority of Nigerians who live in most communities without access to electricity. Even the available electricity capacity is insufficient to meet existing power needs of the less than 40% who have access to the national grid. Therefore, it has become a matter of necessity for exploitation and establishment of other energy resources to complement and supplement the limited power generation and supply available in Nigeria. Fortunately, Nigeria is endowed with abundant natural resources of renewable energy, like the sun, wind, hydros, biomass (waste) etc. As an alternative energy, renewable energy will be a practical alternative to supplementing electricity supply in Nigeria. It can be cost-effective in areas far-flung from the national grid, and simply put, will impact Nigeria's electricity bottom line.

Despite the abundance of natural resources in Nigeria, there were no nationally acceptable renewable energy or energy efficiency policies to drive the renewable energy sector of the economy. Some Ministries, Departments and Agencies (MDAs) before now, have in one way or the other developed documents that enabled them to pursue ventures in renewable energy. But furtherance to the federal government's reform act to diversify Nigeria's energy mix and provide practical, affordable and realistic access to electricity to all Nigerians, an inter-ministerial committee of stakeholder MDAs was constituted and mandated to come up with a national renewable energy and energy efficiency policy that would attract investment into the electricity sector.

After several months of stakeholder meetings, workshops, collation of various documents, etc., by the inter-ministerial committee and the eventual development and submission of the National Policy on Renewable Energy and Energy Efficiency to the Federal Executive Council, we have the distinguished pleasure of presiding over the first ever National Policy on Renewable Energy and Energy efficiency, developed in line with objectives of the National Energy Policy, Rural Electrification Strategy and Plan, Millennium Development Goals and the National Economic and Development strategy. The National Policy is established to remove the

key barriers that put renewable energy and energy efficiency at economic, regulatory or institutional disadvantages relative to other forms of energy in Nigeria. We commend this policy to the Federal Executive Council for consideration and scrutiny. With the eventual passage of the policy, Nigeria will be set to provide a conducive political environment that will attract investments in the renewable energy and energy efficiency arena. A monitoring unit will be set up to oversee the immediate implementations of the recommendations of the policy in the electricity supply industry, which will enhance and leapfrog power projects across the nation.

We acknowledge the valuable roles played by various stakeholders: the inter-ministerial committee, civil societies, academia, our aides and all who worked tirelessly to ensure that Nigeria has a National Policy on Renewable Energy and Energy Efficiency. Most importantly, we would like to thank Mr. President, Dr. Goodluck Ebele Jonathan, GCFR, and the entire Nigerians for the privilege and opportunity to serve our dear country.

Long Live Nigeria!!!

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Acronyms

N	Naira
%	Percentage
AU	African Union
CSP	Concentrated Solar Power
DFID	Department for International Development
DISCOs	Distribution Companies
ECN	Energy Commission of Nigeria
ECN	Energy Commission of Nigeria
ECOWAS	Economic Commission of West Africa
EE	Energy Efficiency
EEEP	ECOWAS Energy Efficiency Policy
EEP	Energy Efficiency Policy
EIS	Electricity Inspectorate Services
EPSRA	Electricity Power Sector Reform Act
EREP	ECOWAS Renewable Energy Policy
ESCOs	Energy service Companies
FEC	Federal Executive Council
FGN	Federal Government of Nigeria
GCFR	Grand Commander of the Order of the Federal Republic
GDP	Gross Domestic Product
GDR	Generation Disclosure Requirement
GENCOs	Generation Companies

GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (German Agency for international Cooperation)
GW	Giga Watt
GWh	Giga Watt Hour
IAEA	International Atomic Energy Agency
ICREEE	Inter-Ministerial Committee on Renewable Energy and Energy Efficiency
IRP	Independent Resource Plan
KWh	Kilo Watt Hour
LHP	Large Hydropower
M	Mitres
m/s	Mitres/Second
MAED	Model for Analysis of Energy Demand
MDA	Ministries, Departments, and Agencies
MESSAGE	Model for Energy Supply Strategy Alternatives and their General Environmental Impact
MW	Mega Watt
MWh	Mega Watt Hour
MYTO	Multi Year Tariff Order
NEEAP	National Energy Efficiency Action Plan
NELMCO	Nigerian Electricity Liability Management Company
NERC	Nigerian Electricity Regulatory Commission
NESI	Nigeria Electricity Supply Industry
NESREA	National Environmental Standard and Regulations Enforcement Agency
NGO	Non-governmental Organisation
NREAP	National Renewable Energy Action Plan

OPEC	Organisation of Petroleum Exporting Countries
PBF	Public Benefit Funds
PHCN	Power Holding Company of Nigeria
PPTC	Power Production Tax Credit
PV	Photovoltaic
R&D	Research and Development
RE	Renewable Energy
REFIT	Renewable Energy Feed-in Tariff
REP	Renewable Energy Policy
RPS	Renewable Portfolio Standard
RRD	Renewable and Rural Power Access Department
SHP	Small Hydro Power
SON	Standard Organization of Nigeria
TCN	Transmission Company of Nigeria
UN	United Nations

Executive Summary

Energy supply in Nigeria can be classified into two main categories, (a) urban and (b) rural. Urban areas are essentially on the grid while rural areas are largely off the grid. Improved energy supply to urban residents is being addressed mainly by the Roadmap for Power Sector Reforms, which was launched by President Goodluck Ebele Jonathan, GCFR, in August 2012. The roadmap essentially focuses on the development of grid-based electricity. However, the on-going power sector reforms will only enable the extension of the national grid to large rural areas which are close to main urban areas.

Rural areas that are remote and have a low demand density will have to depend on off-grid energy solutions as the economies of on-grid deployment do not favour rural electrification. Off-grid areas will have to depend on alternative solutions. The implication of this strategy for improved energy supply across Nigeria will entail the utilization of renewable energy sources at our disposal, both on-grid and off-grid. Consequently, it is essential that a coordinated, coherent and comprehensive renewable energy policy (REP) be put in place to drive hydropower, biomass, solar and wind as energy sources. In this respect, like existing sources of electricity, renewable energy can become a source of energy that may be traded and procured by the power industry as they would procure fossil or non-renewable energy sources. It is intended that the renewable energy policy advanced in this document will serve as a blue print for the sustainable development, supply and utilization of renewable energy resources within the economy for both on-grid and off-grid energy solutions.

This document also advances an energy efficiency policy (EEP). Improvements in the efficiency of power utilization translate directly into newly available power supply. Energy efficiency is a source of energy since it would reduce inefficient consumption, thereby providing greater access to electricity consumers. Considering Nigeria's need to expand its energy supply, it is important that an energy efficiency policy (EEP) be put in place to increase power access while moving the power sector toward greater sustainability. Both renewable energy and energy efficiency can be viewed as part and parcel of a strategy to achieve cleaner and greener energy. Many countries around the globe are pursuing this approach to their energy future. It is therefore important that Nigeria joins the league of aspiring green economies.

Many of the tools necessary to drive renewable energy development and improve energy efficiency require important rule changes and coordinated action by several ministries, departments and agencies (MDAs), which are yet to be actualized. Therefore, this renewable energy and energy efficiency policy mandate timely adoption of key regulations and rule changes required to have a more potent renewable energy and energy efficiency policy. The policy marks the initial steps of aligning the Nigerian renewable energy and energy efficiency policy with the ECOWAS renewable energy (EREP) and ECOWAS energy efficiency policies (EEEP). It therefore mandates the implementation of the national renewable energy action plan (NREAP) and a national energy efficiency action plan (NEEAP), at the completion of which a revised renewable energy and energy efficiency policy will update this one. This steering framework is expected to boost access to energy services and ensure the sustainable growth of clean energy contribution to Nigeria's energy mix. It is expected that subsequent versions of this

policy document will further expand the renewable energy window usage in Nigeria, subject to international developments and local technology development.

Signature Page

Membership of the Inter-Ministerial Committee on Renewable Energy and Energy Efficiency (RE&EE) that Reviewed and Adopted the RE&EE Policy

S/No	Name of Member	Organization		Signature
1.	Engr. A. Adebisi	Federal Ministry of Power	Chairman	
2	Engr. Faruk Y. Yusuf	Federal Ministry of Power	Member/Secretary	
3	Mrs. Grace Ogolo	Federal Ministry of Science and Technology	Member	
4	Engr. Z.O. Akinjogbin	Federal Ministry of Water Resources	Member	
5	Mrs. Iniobong Abiola-Awe	Federal Ministry of Environment	Member	
6	Engr. Julius Olurinola	Federal Ministry of Lands, Housing, and Urban Development	Member	
7	Mallam Imamuddeen Talba	Nigerian Electricity Regulatory Commission	Member	
8	Dr. I.J. Dioha	Energy Commission of Nigeria	Member	
9	Mr. Oyedapo Adeoye	Nigerian National Petroleum Corporation	Member	
10	Engr. John Achukwu	Standard Organization of Nigeria	Member	
11	Engr. C.Y. Longtar	Rural Electrification Agency	Member	
12	Dr. Sunday Wuyep	Nigeria Power Training Institute	Member	
13	Mr. Waziri Lasu	Nigerian Investment Promotion Commission	Member	
14	Engr. Olisa M. Okoli	Transmission Company of Nigeria	Member	
15	Dr. Obi C. Onyia	National Bio-technology Development Agency	Member	
16	Engr. T.T. Aliyu	Electricity Management Services Limited	Member	
17	Engr. J.O. Adekunle	Raw Material Research & Development Council	Memeber	
18	Dr. Albert Okorogu	Federal Ministry of Power	Member	

S/No	Name of Member	Organization		Signature
18	Mr. Oyegbade A. Raji	National Bureau of Statistics	Member	
19	Engr. Amanze Okere	Infrastructure Concession Regulatory Commission	Member	

Purpose

The purpose of this policy on renewable energy and energy efficiency is to:-

i. Set out a framework for action to address Nigerians challenge of inclusive access to modern and clean energy resources, improved energy security and climate objectives;
ii. Recognise the national significance of renewable electricity generation activities by providing for the development, operation and maintenance, and upgrading of new and existing renewable electricity generation activities;
iii. Declare that the proportion of Nigeria's electricity generated from renewable energy sources shall increase to a level that meets or exceeds the ECOWAS regional policy targets for renewable electricity generation and energy efficiency for 2020 and beyond;
iv. Declare Energy Efficiency as a large, low cost, and under-utilized Nigerian energy resource offering savings on energy bills, opportunities for more jobs, improved industrial competitiveness, and lower air pollution;
v. Recognise that poverty mitigation and environmental protection are hindered by the continued predominance and inefficient use of oil and natural gas in meeting our energy needs;
vi. Take a step in the right direction and broadens the definition of energy security to include renewable energy and energy efficiency as equally important indigenous sources of energy, in addition to oil and gas;
vii. Incorporate provisions for renewable energy and energy efficiency generation activities into state policy statements and plans, and recognizes the importance of enabling framework conditions for private investment in renewable energy and energy efficiency;
viii. Set national targets for achievements in electricity from renewable energy and energy efficiency capacity addition by 2020 and beyond;
ix. Require the preparation of national action plan for renewable energy and for energy efficiency and sets a time frame within which implementation is required;
x. Recommend that signatory parties to this policy should collaborate in preparation of the action plans and work together in achievement of the final mandatory targets;
xi. Make it mandatory for the Ministry of power to facilitate the development of an integrated resource plan (IRP) and ensure the continuous monitoring and review of the implementation and effectiveness of the action plans prescribed under the national policy statement and;
xii. Facilitate the establishment of framework for sustainable financing of renewable energy and energy efficiency projects and programmes in Nigeria.

1. Introduction

1.1 Policy Overview

This policy document recognizes the multi-dimensional nature of energy and therefore addresses diverse issues such as renewable energy supply and utilization; renewable energy pricing and financing; legislation, regulation and standards; energy efficiency and conservation; renewable energy project implementation issues; research and development; capacity building and training; gender and environmental issues; planning and policy implementation. The overall thrust of this policy is the optimal utilization of the nation's energy resources for sustainable development.

1.2 Background

The availability of energy plays a major role in every aspect of our socio-economic life. Energy is, and will always be, a key component of the economic, social and political development of Nigeria. Inadequate supply of energy restricts socio-political development, limits economic growth, inclusive growth in particular, and adversely affects the quality of life of citizens, both in urban and rural areas. Improved energy supply results in improved standards of living, which manifests in increased food production and storage, increased industrial output, provision of efficient transportation, adequate shelter, improved healthcare and enhancements in other human services.

Nigeria is blessed with abundant primary energy resources. These include non-renewable energy sources such as natural gas, crude oil, coal and tar sands; and renewable energy sources such as hydro, biomass, solar and wind. However, the economy has mainly depended on the consumption of oil and gas for commercial energy. The use of hydro-power plants, which entered the Nigerian energy scene in the 1960's, now accounts for the second largest energy resource for electricity generation in Nigeria, contributing approximately 26% of the total installed grid- connected generated energy.

By its very nature, renewable energy and energy efficiency is multi-sectorial and as such, should be taken into account by all sectors involved. It should be appreciated that the development strategy being proposed will require that financial support be provided to ensure the growth and development of the sub-sector. This should be regarded as a priority in our strategic thinking. To ensure that the renewable energy and energy efficiency sector develops into a basic and strategic sub-sector, this policy encourage the development of national renewable energy action plan and national energy efficiency action plan which will facilitate the overall achievement of the objectives set out in this policy.

There will also be a need to develop strong and integrated steering frameworks which will boost access to renewable energy services and encourage energy efficiency measures. This framework will also ensure the growth of renewable energy and energy efficiency contribution in Nigeria's energy mix.

1.3 Definitions of Terms

Renewable Energy refers to energy obtained from energy sources whose utilization does not result in the depletion of the earth's resources. Renewable energy also includes energy sources

and technologies that have minimal environmental impacts, such as less intrusive hydro's and certain biomass combustion. These sources of energy normally will include solar energy, wind, biomass, small and medium hydro, geothermal, tide and wave energy.

Energy Efficiency is the efforts to reduce the amount of energy required to provide goods and services or efforts to improve energy conservation. Examples of energy efficiency measures include installing high efficiency lights, natural skylights or other energy efficient devices; insulating a home for optimal cooling or heating and the use of appliances such as water heaters; and the uses of low-energy or efficient refrigerators, freezers, ovens, stoves, water pumps and other appliances. Energy efficient devices use less energy than their older counterparts.

1.4 Need for a Policy

The level of productive use of energy in an economy, coupled with the mix and efficiency of conversion of primary and secondary energy resources to useful energy and the efficient use of energy, are directly indicative of the level and rate of development of the economy. It is therefore essential to put in place a coordinated, coherent and comprehensive renewable energy policy linked to an equally coherent and comprehensive energy efficiency policy.

The evidence from the significant body of literature on renewable energy adoption and deployment suggests that given the intricacies of renewable energy, policy is a game changer. Appropriate policies are therefore needed to create the right incentives, regulation and standards to advance the adoption of renewables. The renewable energy policy will serve as a blue print for the sustainable development, supply and utilization of energy resources within the economy, and for the use of energy resource in international trade and co-operation.

The energy efficiency elements will ensure that Nigerians are optimally judicious in their energy utilization and conservation. A strong energy efficiency policy will also mitigate the risk of future marginalization of the renewable energy percentage contribution to the future power mix, because the contribution may be overshadowed and outpaced by an ever increasing demand for more fossil and renewable energy. Additionally energy efficiency will also increase the likelihood that national benchmarks of renewable energy contribution to the power mix are met in a cost effective way. The renewable energy and energy efficiency policy create synergies between the efficient uses of electricity in general and renewable energy in particular. Both respond together to the energy crisis facing the country today. For instance, energy efficiency measures assist in reducing energy consumption, while allowing renewable energies to meet a larger share of demand.

1.5 Policy Focus

Based on the resource situation and the technological base of the country, this policy will focus on hydropower, biomass, solar, wind, geothermal, wave and tidal energy power plants and co-generation plants for energy production, as well as the improvement of energy efficiency as an additional source of energy. It is expected that subsequent versions of this policy document will

expand the renewable energy window usage in Nigeria, subject to international and local technology developments.

Hitherto, policies in the energy sector had tried to touch on renewable energy and energy efficiency issues. However, they were limited in their scope to only mentioning general issues without giving the detailed framework required to make the difference. Furthermore, none of these policies have dealt with the specific needs of the electricity sector in the context of the on-going electricity market reforms in Nigeria and the privatization policy. It has therefore become necessary to have an integrated renewable energy and energy efficiency policy that addresses the important needs of the Nigerian electricity supply Industry (NESI), backed up by an integrated resource plan (IRP) and national action plans.

This policy refers to the ongoing harmonisation process of renewable energy and energy efficiency policies in the ECOWAS region. It will be implemented through a national renewable energy action plan (NREAP) and a national energy efficiency action plan (NEEAP) which will guide the development of future renewable energy and energy efficiency related sectorial policies, as well as the national action plans to achieve renewable energy and energy efficiency targets. This approach will take input from all stakeholders in a coordinated process to be managed by the Federal Ministry of Power. This will avoid policy conflicts and improve efficiency in the allocation of public and private sector funds, for implementation of renewable energy and energy efficiency programmes by Ministries, Departments and Agencies of government.

An overall national renewable energy and energy efficiency policy is also needed and requested by foreign investors who wish to invest in the nation's economy based on a national program strategy instead of a project based approach.

1.6 Critical Elements of the Policy

Evidence from nations that have successfully implemented a renewable energy policy suggests the importance of the following regulations and economic instruments:

i. Mandatory or voluntary Renewable Portfolio Standards (RPS), which define the percentage of energy generated that must come from renewables by a given target year;
ii. Generation Disclosure Requirement (GDR),which is applicable when consumers have retail choice and have a preference for renewables;
iii. Power Production Tax Credit (PTC) to electricity generation companies, which is aimed at incentivizing the adoption of renewable energy;
iv. Feed-in tariffs (FIT), which typically incentivize electricity producers by offering more favourable pricing for electricity produced through renewables; and
v. The adoption of a Public Benefits Fund (PBF), which requires that a certain percentage of the tariff is dedicated to supporting renewable energy generation projects on and off the grid.
vi. Bidding rounds through national renewable energy independent power producer procurement programme;
vii. Provision of capital grants, tax holidays and exemptions, other incentives for renewable energy projects;
viii. Net metering framework.

The above offer Nigeria a wide range of options to drive renewable energy deployment depending on the type of energy resource being developed and the project size. Each of these policy options can be implemented by the appropriate Nigeria Government Agency by preparing independent policy paper that will give direction to the regulatory authorities and other players.

Similarly, critical elements of a successful energy efficiency policy include the following:

i. Funding mechanism, policy and legislative frameworks, such as:-
    - Incentives for home owners to install energy efficient appliances and lighting;
    - Incentives for producers and importers to offer energy efficient appliances and lighting;
    - Tax credits for home owners who install energy efficiency appliances and lighting.
    - Tax credits to companies who produce such appliances and fixtures.
    - Grants to communities to spur the adoption of community-based renewable energy and energy efficiency processes.
ii. Appropriate institutional arrangements that support energy efficiency and conservation measures.
iii. Co-ordination mechanisms and awareness campaign e.g. effective energy efficiency training of the population.

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

This policy therefore empowers the relevant Ministries, Departments and Agencies of Federal Government of Nigerian to adopt and develop any of the above listed policy, regulations and economic instruments, which are tested around the world in an effort to support, promote and incentivize the entry of renewable energy and energy efficiency in Nigeria. In this policy document, action plans are recommended for all relevant agencies for the adoption of specific policy targets such as FIT and RPS.

A Committee, under the Chairmanship of the Honourable Minister of Power, will review this document at least once a year and result of such review will be used to update or replace this policy subject to approval by the Federal Executive Council (FEC). In view of significant changes in the orientation of the Nigerian Power Sector, especially as regards increased private sector participation, it will also be necessary to involve the representative of private sector, prior to FEC approval of any future review.

1.7 Economic Justification of the Policy

Energy constraints are limiting our economic growth. The application of renewable energy has the potential not only to raise Nigeria's growth rate, but also to deepen its effect on real sectors of the economy. More adequate, reliable and affordable power supply will for instance enhance the modernization of agriculture and in turn support the increasing quality of life. It will create jobs, support productive use and business development as well as improved social service delivery. The right policy will lead to improvements in energy efficiency, and can stretch the reliability and security of energy supply while reducing the adverse environmental impacts on growth, such as air, water and soil pollution that negatively affect consumers. Understanding energy efficiency and conservation as a new energy sources includes that greater efficiency will free up capacities, which in return can be used to expand user connections.

Currently, fuel-wood accounts for over 50% of overall domestic primary energy consumption in the country and is the dominant source of energy in the domestic sector. It is also used in other sectors of the economy, such as cottage industries. Over the years the fuel-wood supply/demand imbalance in some parts of the country has adversely affected the economic well-being of the people. At the national level, increasing fuel-wood consumption contributes to deforestation, with consequences for desertification and soil erosion. This policy is also intended at developing other sources of biomass energy and more efficient conversion of fuel-wood energy, in order to reduce the rapid depletion of wood.

Solar energy resource intensity is generally high in the country. Solar energy is widely used for drying, most especially for agricultural products. But it is normally lumped with the informal sector, which is not adequately captured in the national accounts. Solar as a source of energy is

largely non-existent, with the exception of its use in street lighting, in some homes, in some parks, etc. Nevertheless, the capture of solar energy for electricity has great potential for the provision of power for rural development.

Offshore and onshore wind power plants are a great potential contributor to a more sustainable, ecologically sound energy generation landscape. There is a very good potential to harness energy from wind in Nigeria, especially in coastal areas, offshore, and some inland areas. Small wind generators can be used in off-grid electricity generation on farms, in rural areas, and in homes. Such technology is simple and largely affordable and is incentivized by this policy.

A more efficient use of energy has the ability to reduce energy bills both for public and private sector. In particular in energy intensive industries, an increase in efficiency will effectively reduce costs and imply a great potential for improved competitiveness.

1.8 Energy Security and Growth

Over-dependence on subsidized oil and gas as primary energy sources has slowed down the development of renewable energy in Nigeria. Diversification to achieve a wider energy supply mix will ensure greater energy security for the nation. The domestic demand for petroleum products is growing rapidly. More importantly, the prices of fossil-related fuel stock such as natural gas, coal, uranium, and diesel have continually grown over time, while these sources will eventually run out. A national strategy that ties the future of energy supply to sources that may likely become too expensive or eventually run out is neither sustainable nor wise. This strategy will certainly not enhance energy security.

In contrast, hydro, biomass, solar, and wind energy are infinitely available. These are home-grown energy sources that cost nothing. While the capture technologies are expensive, the feed stock cost is essentially zero and operating costs are restricted to maintenance costs once the investments are made. In addition, improved energy efficiency yields the prospect that economic life cycle savings are greater than the costs of implementing measures.

The development of renewable fuels from locally available energy resources and an energy efficient use should therefore be vigorously pursued and that is the fundamental aim of this policy document. More evenly distributed and efficient power generation is an important consideration for the Nigerian energy sector, in terms of energy security and geo-political balance between the North, the Central belt, and the South of the country. The reason is that solar, the primary and most abundant renewable resource, increases in intensity as one moves from south to north.

The rural populaces, whose needs are often basic, depend to a large extent on traditional sources of energy, mainly biomass, used on inefficient appliances. This class of fuels constitutes over 50% of total energy consumption in the country. Fuel-wood supply/demand imbalance in some parts of the country is now a real threat to the energy security of the rural communities. Efficiency in energy use bears the potential to meet demands better while reducing the consumption of scarce resources.

Electricity supply in rural areas is largely non-existent, denying access to such things as lighting and refrigeration for almost half of the nation. Hence, special attention needs to be paid to the diversification of the energy supply mix in the rural areas. Building into this diversification strategy on effective energy platform will allow rural residents to imbibe a conservation culture as they become more energy dependent.

1.9 Power Roadmap and Support for Electricity Market Reforms

To meet the Nigerian Vision 20:2020 target of 40,000MW, generation capacity would require to be grown by 4.3GW every year. It is obvious that every energy source will need to be considered, if this target is to be met. Correspondingly, large investments will also have to be made. It is expected that these sums cannot and will not be funded directly by the Federal Government. Rather, incentives will have to be provided to the private sector and communities to partner with government in this endeavour.

In August 2010, the President of the Federal Republic of Nigeria, in launching the Power Sector Roadmap, stated that the growth, prosperity and national security of any country are critically dependent upon the adequacy of its electricity supply industry. The Power Sector Roadmap outlined the critical areas required to remove obstacles to private sector investment as the following:

i. The establishment of a bulk purchaser/ trader.
ii. Strengthening the Nigerian Electricity Regulatory Commission.
iii. The provision of Federal Government Credit Enhancement.
iv. Operationalising the Nigerian Electricity Liability Management Company (NELMCO).
v. Strengthening of National Power Training Institute
vi. Strengthening of technical and managerial capacity of the Transmission Company of Nigeria (TCN).
vii. The sale of Nigeria's generating companies (GenCos) and distribution companies (DisCos) to private sector.

The funds required for the maintenance and refurbishment of the renewable energy supply infrastructure and for the expansion of capacity are enormous. It is believed that this policy will drive increased private sector participation and the on-going market reform especially as it relates to procurement of power in the renewable energy sub-sector and as such attract new investments, while the profit motive will assist in solving much of the management problems previously experienced. Incentives and regulations are needed to encourage power generating companies to expand the generation mix to include renewables. Such are also needed to enhance energy efficiency. Additionally, the energy efficiency technology and service market may be as well driven by already cost effective investment opportunities.

Private investment funds required by the renewable energy and energy efficiency sub-sector will be for instance foreign and local capital, private public partnership, environmental/green finance options (i.e. Emission trading) or financing mechanisms via Energy Service Companies

(ESCOs)etc. Thus, the environment must be made conducive to attract such investments and funding opportunities. It will hence be necessary to encourage and promote foreign as well as indigenous private sector participation in the sub-sector.

1.10 Institutional Support and Coordination

Given the vital role of energy in national development and its impact on every aspect of our life, energy planning, including renewable energy and energy efficiency planning, must be viewed as an integral part of national development. This is to ensure that energy development decisions are not taken as isolated sectorial plans, but rather, closely linked and reconciled with those of the rest of the economy. In this regard, the National Planning Commission, Federal Ministry of Finance (especially the Budget Office) and Federal Ministry of Petroleum Resources should focus some attention to and support the Nigeria's energy diversification goals promoted in this policy.

It is also necessary to coordinate all energy related activities in the country. In this respect, the Federal Ministry of Power as the governmental organ responsible for policy making activities within the electricity industry shall help ensure the coordination and implementation of a comprehensive and integrated renewable energy and energy efficiency policy. This will require, as a planning tool, an integrated resource plan (IRP) that looks into the benefits/cost ratio of each renewable energy source, including levelized costs. This development must however be complemented by promoting cooperation between the Federal Ministry of Power and relevant Federal Ministries and Parastatals, such as: Federal Ministry of Water Resources, Federal Ministry of Agriculture, Federal Ministry of Land, Housing and Urban Development, Federal Ministry of Science and Technology, Federal Ministry of Environment, Energy Commission of Nigeria, etc.

Regulatory agencies such as NERC, SON and NESREA shall within the context of their statutory mandates ensure adherence and compliance to power sector regulations and licensing, standardization of equipment and environment impacts.

In order to increase the efficiency and effectiveness of renewable energy delivery in the country, the technological capabilities of renewable energy sector companies to cope with the challenges of future energy development shall be developed.

1.11 States, LGA's and NGOs

There should also exist at state and local government levels units responsible for renewable energy and energy efficiency matters. This policy support the establishment of necessary links between federal and state Government for the formulation of renewable energy and energy efficiency policies, framework and programmes, as well as for the execution of some of the programmes both at federal, state and local Government level. In this regard, the Federal Ministry of Power shall coordinate these activities and support renewable energy project developers to secure land for project development in various States of the Federation.

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

1.12 Policy Objectives

The overall objective of this policy is summarized as follows:

i. To ensure the development of the nation's energy resources, with diversified energy resources option, for the achievement of national energy security and an efficient energy delivery system with an optimal energy resource mix.
ii. To guarantee adequate, reliable, affordable, equitable and sustainable supply of renewable energy at cost-reflective and appropriate costs and in an environmentally friendly manner, to the various sectors of the economy, for national development.
iii. To accelerate the process of acquisition and diffusion of technology, managerial expertise and indigenous participation in the renewable energy and energy efficiency sector industries, for stability and self-reliance.
iv. To guarantee efficient, location-specific and cost-effective consumption pattern of renewable energy resources and improved energy efficiency.
v. To promote increased investments and development of the renewable energy and energy efficiency sector, with substantial private sector participation.
vi. To ensure a comprehensive, integrated and well informed renewable energy and energy efficiency sector, with plans and programmes for effective development.
vii. To foster international co-operation in trade and project development, in the ECOWAS, African Region and the World at large.
viii. To successfully use the nation's abundant energy resources to promote international cooperation.
ix. To bring abundant electricity access to almost half of the Nigerian population that is currently electricity abstinent, including more sustainable provisions for domestic use and cooking.
x. To develop the nation’s renewable energy and energy efficiency resources through the establishment of appropriate financing mechanism that support private investment in the sub-sectors.
xi. To ensure effective coordination and collaboration among all players in renewable energy and energy efficiency activities in Nigeria.

2. Renewable Energy Policy

For each element of renewable energy, the policies, objectives and strategies are outlined in this section as contained in the National Energy Policy (NEP) 2003.

2.1 Hydropower

Hydropower is one of the major sources of base load electricity generation because of its generation stability. Despite its high initial capital cost, it provides one of the cheapest and cleanest sources of electricity.

The country is endowed with large rivers and some natural falls which are together responsible for the high hydropower potential of the country. The Rivers Niger and Benue and their several tributaries constitute the core of the Nigerian river system, which offers a source of energy including large hydropower (greater than 100 MW).In addition, several scores of small rivers and streams do exist and can be harnessed for medium scale hydropower projects (between 30MW and 100MW) and small hydropower (less than 30MW).

The total technically exploitable large scale hydropower potential of the country is estimated at over 10,000 MW, capable of producing 36,000 GWh of electricity annually. Only about15% of this potential had been developed as of 2012. The small and medium scale hydropower potential is estimated to be greater than 3,500 MW of which less than 2%had been harnessed as of 2012. There is the urgent need to develop small and medium hydropower plants for the provision of electricity for the rural areas and remote settlements.

This policy classifies Hydropower as follows:

Pico Hydropower:	Pico <100kW
Micro Hydropower:	100kW ≤ Micro <500kW
Mini Hydropower:	500kW ≤ Mini<1MW
Small Hydropower:	1MW ≤ Small < 30MW
Medium Hydropower:	30MW ≤ Medium<100MW
Large Hydropower:	Large > 100MW

2.1.1. Policies

Key policies to drive the development of hydropower are as follows:

i. The nation shall fully harness the hydropower potential available in the country for electricity generation.
ii. The nation shall pay particular attention to the development of the mini and micro hydropower schemes.
iii. The exploitation of the hydropower resources shall be done in an environmentally sustainable and socially acceptable manner.

iv. Private sector and indigenous participation in hydropower development shall be actively promoted.
v. Planned and ongoing large hydro projects such as Mambila, Zungeru and Gurara II shall be accelerated and accorded higher priority.
vi. Multi-sectorial frameworks shall be designed and put in place to encourage the private sector to develop mini and micro hydropower schemes.

2.1.2. Objectives

Key objectives include:

i. To increase the percentage contribution of hydro-electricity to the total electricity generation and to ensure that a minimum contribution of 10% is maintained at all times from large and small hydros combined.
ii. To extend electricity to rural and remote areas, through the use of mini and micro hydro power schemes.
iii. To diversify the energy resource base and the mix between large, mini and micro hydro.
iv. To further contribute to remote and off-grid power development in Nigeria.
v. To ensure minimum damage to the ecosystem arising from hydropower development.
vi. To attract private sector investments into the hydropower sub-sector.
vii. To develop socially acceptable and equitable hydro power.
viii. To ensure the safety and security of large and small hydro generating facilities.

2.1.3. Strategies

Key strategies include:

i. Establishing and maintaining multilateral agreements to monitor and regulate the use of water in international rivers flowing through the country.
ii. Ensuring increased indigenous participation and the application of gender mainstreaming in the planning, design and construction of micro, mini and large hydropower stations.
iii. Providing basic engineering infrastructure for the domestic manufacturing of components of hydropower plants, equipment and accessories.
iv. Encouraging the private sector, both indigenous and foreign, in the establishment and operation of mini and micro hydropower stations, under the Power Sector Reforms initiative.
v. Providing basic hydro resource assessment, a national hydro prospecting tool, and feasibility analysis of opportunities across the country.
vi. Encouraging the private sector, both indigenous and foreign, in the local production of components of hydropower plants and accessories.
vii. Ensuring that rural electricity boards incorporate small-scale hydropower plants in their development plans.

viii. Promoting and supporting Research and Development activities for the local adaptation of hydropower plant technologies.
ix. Concluding studies and updating data on the hydro potential of our rivers and identifying all the possible locations for dams. The available data will be hosted on the internet, to encourage prospective investors make an investment decision based on a portfolio of bankable projects.
x. Ensuring adequate security for all hydro power plants with respect to off- country sources of water supply.

2.2 Biomass

Organic, non-fossil material of biological origin is called biomass. The biomass resources of Nigeria include wood fuels and by-products from crops such as forage grasses and shrubs, rice husks, and animal wastes and wastes arising from forestry, agricultural, municipal and industrial activities, such as saw-dust, as well as aquatic biomass.

Biomass can be converted into electric power through several methods. The most common is direct combustion of biomass material, such as agricultural waste or woody materials. Other options include gasification, pyrolysis, and anaerobic digestion. Gasification produces a synthesis gas with usable energy content by heating the biomass with less oxygen than needed for complete combustion. Pyrolysis yields bio-oil by rapidly heating the biomass in the absence of oxygen. Anaerobic digestion produces a renewable natural gas when organic matter is decomposed by bacteria in the absence of oxygen.

Different methods work but with different types of biomass. Typically, woody biomass such as wood chips, pellets, and sawdust are combusted or gasified to generate electricity. Corn Stover and wheat straw residues are baled for combustion or converted into a gas using an anaerobic digester. Very wet wastes, like animal and human wastes, are converted into a medium-energy content gas in an anaerobic digester. In addition, most other types of biomass can be converted into bio-oil through pyrolysis, which can then be used in boilers and furnaces.

2.2.1. Policies

Key policies to drive the development of electricity generation from biomass are as follows:

i. The nation shall effectively harness biomass resources and integrate them with other energy resources for electricity generation.
ii. The nation shall promote the use of efficient biomass conversion technologies.
iii. The use of waste wood as a source of electricity shall be encouraged in the nation's energy mix.
iv. The nation shall intensify efforts to increase the percentage of land mass covered by forests in the country.

2.2.2. Objectives

Key objectives include:

i. To promote non-wood fuel biomass as an alternative energy resource, especially in the rural areas, and promote its usage for remote and off-grid power generation.
ii. To promote efficient use of agricultural residues, municipal wastes, animal and human wastes and energy crops as bioenergy sources.

2.2.3. Strategies

Key strategies include:

i. Developing extension educational and outreach programmes to facilitate the general use of new biomass electricity technologies.
ii. Promoting Research and Development in biomass technology and fuels.
iii. Establishing pilot projects for the production of biomass energy conversion devices and systems.
iv. Providing adequate incentives to local entrepreneurs for the production of biomass energy conversion systems.
v. Training of skilled manpower for the maintenance of biomass energy conversion systems.
vi. Developing skilled manpower and providing basic engineering infrastructure for the local production of components and spare parts for biomass systems.
vii. Cultivating fast growing tree species needed to accelerate the regeneration of forests.
viii. Developing appropriate technologies for the utilization of alternative energy sources from fuel-wood.

2.3 Solar

Solar radiation incident on the earth's surface varies in intensity with location, season, day of the month, time of day, instantaneous cloud cover and other environmental factors. However, the incorporation of efficient storage devices in solar energy conversion systems will take care of this intermittent nature of the availability of solar radiation. Electricity is generated from solar energy predominantly through photovoltaic materials (cells or modules) that converts sunlight into electricity.

Nigeria lies within a high sunshine belt and within the country; solar radiation is fairly well distributed. The annual average of total solar radiation varies from about 12.6 MJ/m^2-day in the coastal latitudes to about 25.2 MJ/m^2-day in the far North. Solar energy is renewable and its utilization is environmentally friendly. Consequently, when the availability and environmental costs of the utilization of other forms of energy are considered, the competitiveness of solar energy becomes very evident, particularly for low to medium power applications.

Solar electricity comes through the PV or the thermal systems. Radiation conversion technologies are generally either of the solar-thermal type (solar heating, cooling, drying,

thermal power plant, etc.) or of the photovoltaic type (direct conversion to electricity). Areas of application of solar thermal technologies include crop drying, house heating, heating of process water for industries, hospitals, air-conditioning, preservation of foods and drugs, and power generation. Photo-voltaic (PV) power will be utilised in low to medium power applications and in remote areas, in such uses as communication stations, rural television and radio, streetlights, water pumping, refrigeration and powering security cameras, which require power of the order of 1-10 kW. It may also be used for power supply to remote villages not connected to the national grid. It is also possible to generate PV power for feeding into the national grid. Concentrated solar power (CSP) projects will be used for utility scale power plants of larger than20MW capacity. The solar-thermal electricity technologies will have to be supported by technical expertise.

2.3.1. Policies

Key policies to drive the development of solar for electricity production are as follows:

i. The nation shall effectively harness solar energy resources and integrate them with other energy resources.
ii. The nation shall promote the use of efficient solar energy conversion technologies, such as use of photo-voltaic, solar-thermal and concentrated solar panels for power generation.
iii. The nation shall promote solar energy generation for productive use.
iv. The nation shall intensify efforts to increase the percentage of solar energy in the present energy mix.
v. The nation shall promote the development of energy storage technologies.
vi. The nation shall compliment solar power development with energy efficiency programmes.

2.3.2. Objectives

Key objectives include:

i. To increase the percentage contribution of solar energy to the total energy mix and to ensure a minimum electricity contribution of 3% by 2020 and 6% by 2030.
ii. To extend electricity to rural and remote/off-grid areas, through the use of solar home systems and ultimately promote solar photovoltaic and solar thermal applications to ensure that solar energy can be used for production of electricity.
iii. To increase the share of Solar Water Heating technologies for social services, commercial and industrial processes.
iv. To conserve non-renewable resources used in generation of electricity.
v. To diversify the energy resource base of the nation.
vi. To further contribute to remote and off-grid power development in Nigeria.
vii. To ensure minimum damage to the ecosystem.
viii. To enhance Nigeria's domestic development of appropriate energy storage technologies and energy efficiency programmes.

2.3.3. Strategies

Key strategies include:

i. Developing extension programmes to facilitate the use of solar home systems.
ii. Promoting Research and Development in solar energy technology.
iii. Establishing projects for the production of solar energy conversion devices and systems.
iv. Sourcing and providing adequate incentives to local entrepreneurs for the production of solar energy conversion systems.
v. Implementing a web-based solar prospecting tool that translates solar resources into potential power generation at the local level. This would require updated renewable energy resource assessments to prepare for bankable projects.
vi. Training of skilled manpower for the maintenance of solar energy conversion systems.
vii. Developing skilled manpower and providing basic engineering infrastructure for the local production of components and spare parts for solar energy conversion systems in line with regional/ECOWAS target.
viii. Establishing micro-credit facilities for entrepreneurs, especially for women groups, for the establishment and operation of commercial solar energy facilities in remote and off-grid areas.
ix. Developing an appropriate pricing structure and feed-in tariffs to encourage the development of concentrated solar power or similar projects.
x. Organizing systematic public enlightenment campaigns on the benefits of using solar home systems. and solar water heating.
xi. Establishing incentives for the domestic development and development of energy storage technologies.

2.4 Wind

Wind is a natural phenomenon related to the movement of air masses caused primarily by the differential solar heating of the earth's surface. Seasonal and locational variations in the energy received from the sun affect the strength and direction of the wind. The annual average wind speed at 10m heights varies from about 2 m/s in the coastal areas to about 4 m/s in the far north. At 50m, the range is 2m/s to 8m/s. It is possible to convert wind energy to rotary mechanical energy and electrical energy for a variety of uses.

Wind energy has been utilized for centuries for water pumping as well as for the milling of grains. For meaningful exploitation of wind energy, a necessary prerequisite is the optimisation of the components of wind water pumping and wind electricity generation. In view of the energy available in the wind, there is a need to embark on a wind energy development programme.

Wind energy is the energy contained in the movement of air in form of wind, which can be used to turn the blades of windmills or wind turbines, which in turn could drive electrical generators

to produce electricity. Large modern wind turbines operate together in "wind farms" to produce electricity for utilities, while small ones can meet localized and small energy needs. Wind energy has few ecological and social drawbacks. The view shed complaints and bird strike concerns that exist in many developing countries will probably not deterrents to development in Nigeria.

2.4.1. Policies

Key policies to drive the development of wind are as follows:

i. The nation shall commercially develop its wind energy resource and integrate this with other energy resources into a balanced energy and electricity mix.
ii. The nation shall take necessary measures to ensure that this form of energy is harnessed at sustainable costs to both suppliers and consumers in the rural areas.
iii. The nation shall ensure the development of indigenous small scale wind generating devices and energy storage devices.

2.4.2. Objectives

Key objectives include:

i. To develop wind energy as an alternative renewable energy resource.
iv. To develop local capability in wind energy technology.
v. To use wind energy for provision of power to rural areas and remote communities far removed from the national grid.
vi. To apply wind energy technology in areas where it is technically and economically feasible to feed the grid.

2.4.3. Strategies

Key strategies include:

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

viii. Developing zoning and regulatory wind energy guidelines to prevent inappropriate public outcry against deploying wind energy installations.

2.5 Geothermal, Wave and Tidal Energy

Geothermal, wave and tidal energyresources are among the various energy resources that are available in Nigeria. Although these resources are not in use for energy supply at the moment, this policy encourage relevant agencies to ensure that data and information relating to these resource are obtained through research and development programmes with a view to immediately commence using this resources to provide power supply where ever it is competitive.

2.6 Power Supply and Utilization

As a form of energy, electricity enjoys considerable and diverse applications because of its flexibility and ease of transmission and distribution. Availability of electricity remains a major factor in the location of industries and a strong instrument of social development. Its supply is however still inadequate in the country and furthermore hampered by high technical and informal losses in transmission and distribution.

As at December 2012, the actual generation capability has been increased to 5,282MW and peak energy transmitted to Nigerians hovered around 4,100MW.

The annual consumption of electricity has been increasing very rapidly over the last three decades and is projected to continue increasing. It is forecasted that the actual suppressed demand is in excess of 12,500 MW. This suppressed demand is caused largely by inaccessibility to the national grid and inadequate electricity supply. One consequence of this is that various industries and other consumers have installed generators whose total capacity is estimated to be higher than the total installed capacity of the national grid as at 2012.

In recent times, the domestic (household) sector has accounted for over 50% of the grid electricity consumed in the country while the commercial and industrial uses have accounted for approximately 25% each.

In view of the ever-increasing demand for electricity in the country, there is a need to install more power capacity, promote demand side management measures and introduce renewable sources of energy to the energy mix. It is expected that this increase in power supply will be complimented by increasing investment to ensure reduction in transmission and distribution losses.

2.6.1 On-Grid Renewable Electricity Supply

In formulating the Vision 20:2020 aimed at making Nigeria the 20th largest economy of the World, the Federal Government of Nigeria (FGN) aimed to increase and sustain the growth rate of the country. To sustain such growth, Nigeria's electricity generation would have to increase by significantly more than the projected growth rate. Analysis of energy consumption by similar economies suggests the need for over 40,000MW of electricity by 2030. Therefore, by 2030, Nigeria might need to increase electricity generation over sevenfold. The projected growth rate required to achieve Vision 20:2020 will definitely demand even greater production than 40,000 MW by 2030.

Increasing energy efficiency will help decouple economic growth from electricity consumption growth and slow down annual power plant capacity addition. Such decoupling will also entail the development of large renewable energy projects to be transmitted via the grid. In addition to supporting the construction and completion of existing major hydro power projects, this policy is expected to further stimulate the development of large-scale renewable electricity projects. Hydropower, wind power and solar power will be an immediate priority, with the goal of having three major renewable energy projects namely, a major hydro, a large-scale wind, a large scale PV solar power plant, biomass electricity generating plant and a Concentrated Solar Power (CSP) plant ready for final investment decision within the next 18 to 24 months, with full feasibility studies completed (resettlement, environmental and social impact assessments).

2.6.2 Off-Grid Renewable Electricity Supply

It is estimated that 70% of Nigerians that live in rural areas currently do not have access to the National electricity power grid. These communities are typically found in:

i. The far North-East and far North-West, up to the border with Niger Republic and Cameroun
ii. The coastal areas of the Niger-Delta.
iii. The highlands of the South-West, up the border with the Republic of Benin.
iv. The mountainous regions of the South-East, up to the border with Cameroun.

This lack of access has had a negative impact on economic growth in Nigeria by placing significant constraints on the productive capacity of micro-entrepreneurs and rural supply chains. The problem of access to electricity in rural areas of Nigeria has continued, despite the fact that small-scale subsistence farming contributed 36.6% to GDP, in 2009. Historically remote location electrification programs have faced the following major obstacles:

i. Low population densities result in high operating costs.
ii. Consumers are often poor and their electricity consumption low.
iii. Non-continuity in the orderly planning and running of programs.

In spite of these problems, many countries have successfully provided electricity to rural areas. Recent advances in both the technologies for off-grid systems, as well as a robust framework to support implementation strategies have contributed to the success. Therefore, this policy seeks to drive the framework for supply of productive electric power to all remote off-grid communities in Nigeria in a sustainable and commercially viable manner using renewable energy sources.

Off-grid renewable electricity projects are vital to meeting the Federal Government's targets in the electric power sector and expanding access to rural areas, in particular. The "Light-Up Rural Nigeria" Campaign will have to be intensified to achieve greater off-grid electricity supply. It is expected that this policy will enable the development of a framework to leverage on the capabilities of the Nigerian private sector, for technical appraisal, engineering design, project management and delivery of renewable energy projects. Consequently, the framework to be developed and deployed will as well consider the utilization of possible public-private partnership project modelsfor the deployment of renewable energy projects in rural areas.

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

2.6.2.1 Objectives

Key objectives include:

i. To ensure the provision of electricity to all remote and off-grid areas of Nigeria as well as increasing the energy mix of grid supplied electricityin line with regional/ECOWAS policy and target.
ii. To stimulate industrialization in the rural and remote areas of Nigeria in order to retard rural- urban migration.
iii. To provide reliable and stable power supply to consumers, especially to industries in remote and off-grid areas and productive use.
iv. To ensure the removal of bottlenecks to the development of off-grid electricity in Nigeria.
v. To broaden the energy options for generating electricity.
vi. To attract investment capital, both foreign and domestic, for the development of the renewable energy for both on and off-grid projects.
vii. To maximize access by Nigerians to the investment opportunities in the electricity industry, created by the Nigerian power sector reforms.

2.6.2.2Strategies

Key strategies include:

i. Rural Electrification Agency (REA) to carry out feasibility studies on using renewable electricity power generation for remote and off-grid areas.
ii. Commence feasibility studies for a major hydro, a large-scale wind, offshore wind, wave energy, biomass power, Concentrated Solar Power (CSP) plant and other renewable energy sources ready for final investment decision within the next 18 to 24 months.
iii. Commence feasibility studies for small community renewable electricity solutions for off-grid areas, including home based wind and solar, mini, micro and pico hydro, tidal energy and biomass.
iv. Support the establishment of basic engineering infrastructure for the local manufacture of solar energy equipment, devices and materials.
v. Encourage research and development in the generation and distribution of electricity from renewable energy sources, to be used in mini-grids.
vi. Develop and implement a programme for the participation of the private sector in the remote and off-grid sectors of the electricity Industry.
vii. Intensify the national effort in training, research and development with a view to generating electricity using solar, wind, biomass and other renewable resources in order to conserve our fossil fuels.
viii. Provide appropriate incentives to entrepreneurs to ensure adequate returns on investment in power generation from renewable energy sources.
ix. Provide appropriate financing facilities to support indigenous investments in renewable electricity power generation for remote and off-grid sectors areas.
x. Encourage off-grid generation and supply of power in remote areas.

2.7 Renewable Energy Financing

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

2.7.1 Objectives

Key objectives include:

i. To ensure the availability of adequate funding for the renewable energy sub-sector.
ii. To ensure continuity in the funding of projects in the renewable energy sub-sector.
iii. To attract foreign investments from a highly competitive international finance market.
iv. To ensure that renewable energy supply options adopted are the most cost-effective for the country.
v. To increase foreign exchange earnings through export of renewable energy.
vi. To encourage the local development of renewable energy technology with a view to minimizing the cost input of renewable energy projects in line with regional/ECOWAS policy and target.
vii. To encourage local government and community investment in renewable energy projects.

2.7.2 Strategies

Key strategies include:

i. Dedicating a certain percentage of the nation's revenues from conventional energy sub-sector to support training, research, development and demonstration, technical standards and technology acquisition in the renewable electricity sub-sector.
ii. Dedicating a significant percentage of the nation's revenues from the privatisation of Nigeria's PHCN infrastructure to the provision of grants to local communities for investment in renewable energy projects.
iii. Implementing a framework for the use of Sovereign Guarantees to support appropriate renewable electricity projects.
iv. Providing fiscal incentives, subsidies to alleviate up-front costs, tax and duty exemptions for prospective investors in the renewable energy sub-sector.
v. Reviewing the existing laws and regulations with respect to the operations of EPSR 2005 and simplification ('fast track procedure'), so as to increase private sector participation in the renewable energy sub-sector.

vi. Ensuring a reasonable return on investments through cost-effective renewable electricity pricing.
vii. Establishing guaranteed and dependable repayment schemes for investments in renewable energy projects.
viii. Encouraging renewable energy firms to source development funds from the Nigerian capital market.
ix. Expanding the scope of venture capital financing to embrace investments in the renewable energy sector.
x. Improving the overall macro-economic and financial framework that ensures the availability and affordability of long-term funding for investors in renewable electricity.
xi. Mainstreaming renewable energy in the country's institutional legal and regulatory frameworks.
xii. Providing grants to local governments and communities to support renewable energy planning and implementation projects.

2.7.3 Participation by international Donors and NGO's

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

2.7.3.1 Objectives

The following objectives will drive the financing of renewable energy:

i. To ensure that International Donors and NGO's that are active in and interested in developing renewable energy in Nigeria are encouraged to do so in a well-coordinated manner.
ii. To ensure the renewable energy programs being deployed by NGO's in Nigeria, have the desired impact and yield the desired result.
iii. To ensure that Nigeria participates in renewable energy programs being rolled-out by NGO's, and to ensure that Nigeria's renewable energy competence is developed, as well.

2.7.3.2 Strategies

Key strategies include:

i. The Federal Ministry of Power shall annually engage all NGO's currently operating in the Nigerian renewable energy sector, with the intention of having them articulate their annual renewable energy program targets.
ii. The Federal Ministry of Power shall continually engage the NGO's to ensure close cooperation during the development of renewable energy projects.

iii. Government shall encourage NGO's to support the renewable energy sub-sector by providing competence building tools and assessments, and capacity building trainings.
iv. NGO's, Development Partners, Civil Society, and Donors to liaise/work with the Federal Ministry of Power and fund demonstration renewable energy projects and renewable energy feasibility studies through provision of grants and donations.

2.7.4 Participation by Local and Foreign Banks

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

2.7.5 Indigenous Participation

Exploration, production and conversion activities in the renewable energy sub-sector are characterized by large capital demands and often advanced technology. The capital formation capability of the country's private sector and the level of domestic technological development are still low, in relation to what are needed by the renewable energy sub-sector. Consequently, government and NGO's had played a dominant role in investments in the sub-sector, while private sector presence, technological input and value added in energy sector activities have hitherto been overwhelmingly foreign, mainly from NGO's.

If private sector participation in the renewable energy sub-sector is increased and government spending in the sector is optimised, the ability of the indigenous private sector, including ordinary Nigerian citizens, to participate and compete in the process should be encouraged, so as to allow for a secure and healthy development of the renewable energy sub-sector. It is expected that the local content of value added in the renewable energy sub-sector activities shall be raised to, and maintained at, a high level.

2.7.5.1 Objectives

Key objectives include:

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

iv. To ensure a socio-economically and politically healthy and secure development of the renewable energy sub-sector.

2.7.5.2 Strategies

Key strategies include:

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

2.8 Feed-in Tariffs: Regulation and Incentives

To ensure a stable and attractive pricing policy for renewable energy sources, the National Electricity Regulatory Commission (NERC) will introduce and develop optimal economic instrument for small hydro schemes not exceeding 30MW, all biomass cogeneration power plants, solar and wind-based power plants, irrespective of their sizes. It is expected that specific tariff regimes formulated by NERC shall be long term, guarantee buyers under standard contract and provide reasonable rate of return. NERC will also develop other tariff-related incentives and regulations to support renewable electricity adoption thus, renewable energy projects shall also be eligible for-

(i) Guaranteed Market- In pursuant of this policy, NBET, DisCos or any other identified off taker shall be encouraged to buy the electricity offered to the electricity market from renewable energy sources at rate determined by the regulator (NERC).
(ii) Grid Connection- The net energy available for sale and connected to the grid, shall be determined after taking into account auxiliary loads, transformation efficiency, plant availability and other similar considerations and may be approved by the regulator (NERC).
(iii) Renewable IPPs selling electricity generated to the grid shall enjoy power up 50MW simplified licensing procedure which the regulator shall provide a template and a concessional fee structure for such incentives
(iv) Land and site access- The Federal Ministry of Power shall collaborate with State or Local Government to assist investors in the acquisition of land and rights of way. However, the primary responsibility as well as costs of acquisition/compensation will be on account of the project company.
(v) Waive licensing for renewable energy plant with less than 1 MW at a site

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

3. Energy Efficiency Policy

Energy efficiency has proven to be a cost-effective strategy for building economies without necessarily increasing energy production.Energy efficiency increases energy productivity or the ratio of output and quality of goods and services per unit of energy input. In essence, Nigeria can stretch what it produces to accommodate more production of goods and quality of life.

A stock taking in the ECOWAS community in 2013 indicated that 30% savings of electricity are feasible in the region by economically viable energy efficiency measures. The targeting of energy efficiency as a national goal can hence lead to new commercial and economic opportunities beyond traditional energy. Products such as efficient solar powered stoves and refrigerators, natural gas furnaces for industries, solar ground water pumps, efficient lighting technologies and Smart Meters represent new product opportunities.

Energy efficiency and renewable energy are the "twin pillars" of a sustainable energy policy. Implemented together, the options to reduce carbon dioxide emissions (for instance)increase commensurably as energy efficiency measures address the challenge of making the most effective use of the country's energy sources. Vice versa, renewable electricity applications help meeting the rapidly growing demand with clean energy solutions. Integrating renewable energy and energy efficiency in one policy promises more substantial impacts on mitigating the energy crisis in the country and improving access, than a separate consideration.

Even when adequate and diversified energy supply options in the country exist, the problem of unreliability of supply due to a lack of sufficient and efficient power generating capacities constitutes a huge drain on the national economy. This leads to energy insecurity and has constituted a major characteristic of the energy crisis experienced by the country over the last decade, especially with regards to the supply of electricity. Therefore, attention must be given to alternative sources of supply, adequate production levels and a reliable and efficient distribution network for all fuel types to ensure steady economic growth.

3.1. Energy Efficiency and Conservation

Presently, energy utilisation in our economy is far from efficient. Apart from direct losses, using energy inefficiently has three major implications to the national economy, namely, investments in energy supply infrastructure in excess of what is required; increased environmental problems; and increased cost of goods.

The potential for energy savings in the Nigerian economy is huge, especially in the three main energy demand sectors, namely household, industry and transportation. In the household sector, there is considerable energy loss due to inefficient household appliances, in particular for lighting and refrigeration, productive use but as well due to inefficient technologies such as the traditional three-stone stoves used for cooking mainly in the rural areas. Similarly, there is considerable scope for harnessing energy saving potentials in the Nigerian industries, where energy is an important cost factor. Energy audit studies have shown that as much as 25% of industrial energy can be saved through simple housekeeping measures. More energy can as well be generated by reducing the current30% to 40% losses in transmission and distribution. Also,

our transport sector has substantial opportunities for savings, most especially the road transport sub-sector. It is therefore imperative to promote energy conservation and efficient energy utilization in all sectors of the economy.

3.1.1. Policies

Key policies to drive the promotion of energy efficiency are as follows:

i. The nation shall promote the adoption of energy saving appliances and devices through a nationwide energy campaign and training sessions.
ii. The nation shall provide incentives for consumer adoption of energy saving technologies.
iii. The nation shall provide incentives for retailers and importers of energy efficient products and promote local manufacturing of such products.
iv. The Federal Government shall take the lead in implementing the replacement of inefficient devices with energy efficient ones and promote the same at the state and local levels.
v. The nation shall monitor the progress being made in the adoption of energy efficiency.

3.1.2. Objectives

Key objectives include:

i. To ensure the prudent exploitation of the nation's energy resources.
ii. To enhance energy security and self-reliance.
iii. To reduce the production cost of energy-dependent goods and services.
iv. To reduce adverse impacts of energy utilization on the environment.
v. To eliminate avoidable investments in energy supply infrastructure.

3.1.3. Strategies

Key strategies include:

i. To declare energy efficiency as a source of energy that can be bought and sold. This will include tariff provisions for DisCos that promote and achieve high efficiency within their customer base.
ii. Providing institutional arrangements and incentives for the promotion of energy conservation and the use of energy efficient technologies and processes for domestic, industrial use and services as well as the transport sector and urban planning
iii. Developing energy efficiency building codes so that buildings are designed to take advantage of climatic conditions in order to reduce energy consumption.
iv. Ensuring the importation of the more energy- efficient equipment and machinery.
v. Promoting Research and Development activities in energy conservation and efficiency, including the development and manufacture of energy- efficient equipment and machinery under consideration of standards and labelling.
vi. Encouraging the production and use of improved and more-efficient cooking stoves.
vii. Tasking the Nigerian Electricity Regulatory Commission (NERC) and other responsible agencies to implement the tariff and rule changes that will form the basis for more meaningful renewable energy electricity policy targets.

viii. Promoting public awareness about the benefits of improved energy efficiency.
ix. Promoting efficiency improvements with regard to electricity transmission and distribution.
x. Mandating the deployment of energy saving light fixtures in federal government offices and facilities.
xi. Ensuring that the National Building Code requires every new house design in Nigeria must incorporate energy saving measures such that the energy use in the building is at the barest minimum by using light emitting diode (LED) and other efficient devices and equipment.
xii. Encourage all building in Nigeria to install renewable source of energy as much as possible e.g. roof top solar PV modules, solar water heaters, small wind turbine, biogas system and energy efficient wood stoves.
xiii. Implementation of energy audit programme nationwide and enforcement of various standards for efficient energy use.

3.2. Energy Efficiency Financing

Financing is crucial to realizing the Federal Government's policy thrust in energy efficiency. Government agencies must switch from inefficient equipment and fixtures to new and more efficient ones. Home owners and businesses must do the same. Government's basic framework for financing is to create incentives for these changes.

The following strategies are specifically designed to accelerate gains in efficiency:

i. Creation of an energy efficiency fund to be managed by the Federal Ministry of Power or its appointed agent to provide rebates to on-grid customers who implement substantive changes in their equipment to gain efficiency.
ii. Developing a framework for the distribution of these funds as reimbursements for applicable technologies based on a list of qualified energy efficiency expenditures.
iii. Maintaining a list of qualified energy efficient equipment for which buyers will receive a refund. The percentage of the cost of purchase will be determined by the Renewable and Rural Power Access (RRD) department of the Ministry of Power.
iv. Researching and developing other financing mechanisms for energy efficiency, including options of private sector financing.
v. Improving the overall macro-economic and financial framework that ensures the availability and affordability of long-term funding for investors in energy efficiency.
vi. Mainstreaming energy efficiency in the country's institutional legal and regulatory frameworks.
vii. Providing a duty free incentive to importers of energy saving equipment for a period of 5 years starting from the approval and operation of this policy. This program will also be managed by the EIS department in coordination with other stakeholders.
viii. Providing a 0.5% addition to the budget of each Ministry, Department, and Agency (MDA) to facilitate the purchase and installation of energy efficient appliances or mandating each MDA to devote a minimum of 0.5% of their budget to upgrading their equipment and fixtures.

3.3. Participation by NGOs

The Federal Government is committed to mobilizing NGOs, development partners, and foundations to support the nation's policy in energy efficiency.

3.4. Research and Development

The nation shall boost an energy efficiency research and outreach program in conjunction with Energy Commission of Nigeria and provide seed funds for their activity.

4. Other Energy Issues

Renewable energy and energy efficiency need to be designed according to the needs and specific conditions of the country but consistent with the ECOWAS regional policies. At the same time further assessments are required to spur the development of the renewable energy sector and the improved energy efficiency in the country. Appropriate technologies will be utilised in the exploitation of the various renewable energy resources to minimize the harmful effects on the environment. Research and Development will be used to ensure optimal utilisation of various renewable energy sources and energy efficiency measures.

Joint efforts within bilateral and regional cooperation will complement the country's efforts to promote an improved energy access.

4.1. Research Development and Training

The crucial dependence of the sustainable socio-economic advancement of any nation on research, development and training activities is now universally acknowledged. This dependence is applicable also to the development of vital sectors of the national economy, including the renewable energy and energy efficiency sub-sector. For this sector therefore, it is important that research, development and training are given adequate attention with regards to key issues such as energy resources development and utilization.

4.1.1. Objectives

i. To initiate and promote renewable energy and energy efficiency related research and development programs; and ensure that such programs are applications- oriented and market driven.
ii. To promote participation in research and development by Nigerians in all areas of energy exploration, development and utilization.

4.1.2. Strategies

i. Developing and promoting local capability in the nation's Renewable Energy Centres and Research Institutes for the design and fabrication of energy efficient devices and technologies for the utilization of renewable energy resources.
ii. Promoting the demonstration and dissemination of renewable energy and energy efficient devices and technologies for their adoption and market penetration.
iii. Monitoring and assessing international renewable energy and energy efficiency technological developments and initiating and sustaining local capability for their applications in all sectors of the economy.
iv. Initiating and promoting renewable energy and energy efficiency educational programs and research activities in tertiary institutions and research institutes.
v. Encouraging result oriented research and development, including information systems and software solutions, in the renewable energy and energy efficiency sector by making expenditure on such efforts tax deductible.

vi. Establishing training programs for the development of specialized energy manpower through National Power Training Institute of Nigeria (NAPTIN) and other related agencies.
vii. Encouraging data collection and statistical analysis of energy consumption patterns and penetration of different energy conversion and use technologies in different sectors as well as adequate renewable energy resource assessments.

4.2. Bilateral and Regional Cooperation

Nigeria is involved in bilateral, regional and international arrangements in the area of renewable energy and energy efficiency within the framework of its economic relations with other countries and multilateral institutions. Relevant MDAs including Ministry of Foreign Affairs and Federal Ministry of Justice shall be involved in the negotiation and implementation of such bilateral agreements. This collaboration is designed to complement domestic efforts towards energy security for the nation. Renewable electricity supply, joint management and equity participation in the development of renewable energy sources and energy efficiency measures are important aspects of our bilateral and multilateral cooperation arrangements with other African Countries.

The nation's membership of sub-regional, regional and international organizations such as ECOWAS, AU, UN, IAEA and OPEC provides opportunity for it to play an active role in their renewable energy and energy efficiency agenda. It is necessary to foster this multilateral co-operation for rapid national economic development. From past experiences in the effort of the Africa region towards economic integration, it is clear that a step-by- step approach based on common interests and the pooling of resources offers the best prospects for a successful and lasting integration. In this respect, the renewable energy and energy efficiency sector offers some mutually beneficial opportunities for projects which can be implemented in the short to medium term. Consequently, Nigeria's renewable energy resources and energy efficiency potentials shall be deployed in promoting and enhancing regional and international co-operation for the overall economic and technological advancement of the nation. Nigeria shall also lay emphasis on fostering and strengthening renewable energy and energy efficiency cooperation and integration within the ECOWAS sub-region.

4.2.1. Objectives

i. To enhance Nigeria's effective participation in international renewable energy and energy efficiency related organizations.
ii. To facilitate the acquisition of technology for the development of the renewable energy and energy efficiency sector.
iii. To encourage a cooperative approach in the exploitation of renewable energy resources, energy efficiency potentials and development of renewable energy and energy efficiency supply infrastructure.
iv. To optimize the utilization of the region's renewable energy resources and to promote the more efficient use of energy.

4.2.2. Strategies

i. Working out a co-coordinated approach to regional and sub-regional renewable energy and energy efficiency planning based on co-operation and consultation among member countries of ECOWAS and other members of the African Union (AU).
ii. Facilitating the establishment of mechanisms within the ECOWAS sub-region and other African countries to enhance energy trade and interchange of relevant technology and information.
iii. Promoting favourable trading relationships with member countries of ECOWAS and the AU which will ease the financing of renewable energy supply, energy efficiency measures and other energy-related projects.
iv. Ensuring Nigeria's active membership in renewable energy and energy efficiency related regional and international organizations.
v. Pooling available human resources through networking of national renewable energy and energy efficiency training and research centres.
vi. Encouraging the standardization of renewable energy related plants, renewable energy and energy efficiency machineries and spares and the establishment of infrastructural facilities within the community for their production and certification.

5. Planning and Policy Implementation

The Federal Ministry of Power is responsible for overall planning, development, monitoring and implementation of all policies for the electricity sector in all its ramifications. This function ensures consistency and alignment of the electricity sector with the national energy policy and plans. The development and implementation of policies by any energy related Ministry must be consistent with provisions of the National Energy Policy which is coordinated by the Energy Commission of Nigeria (ECN) as provided by the ECN Decree of 1979, 1988 and 1989. At the sub-sectorial level, more specific sub-sectorial planning and policy implementation for the development, exploitation and utilization of particular energy resources, are carried out in the various energy sub-sectors' Ministries, Departments and Agencies.

5.1. Planning Framework

Several alternative frameworks to guide renewable energy and energy efficiency planning will be considered. These planning methodologies will include:

i. Integrated rural development, where electricity is treated as a component of infrastructure development.
ii. Area coverage, where renewable electricity will be planned to quickly reach as many customers within a particular area as possible, using grid extension for households close to the grid, and isolated renewable electricity generation for remote areas.
iii. Intensification, whereby focus will be placed on adding connections in electrified areas, whilst adding renewable power generation sources to the grid.
iv. Complementary planning of renewable energy and energy efficiency measures for optimisation of effects.
v. Focus on efficiency, whereby existing energy supply in the major sectors (domestic, industries, transport) shall be used in the most efficient way.

An important step is to understand where people live and how best to reach them given existing infrastructure. This suggests distribution planning as the natural starting point for a national analysis.

5.1.1. Strategies

i. Strengthening co-operation between the Ministry of Power and the other bodies active in the renewable energy, energy efficiency and planning sectors.
ii. Encouraging formal discussion and collaboration between institutions in the renewable energy– energy efficiency and planning sectors whose activities are inter-related.
iii. Establishing energy planning and implementation units at state government levels and assigning responsibilities for energy related matters at local government levels.
iv. Ensuring that the strategic plans and programmes of the renewable energy and energy efficiency sub-sectors are appropriately appraised with a view to ensuring

consistency with the overall national energy policy and plans and resolving conflicts arising from sub-sectorial plans and programmes.

v. To strengthen exiting national electricity information gathering system including but not limited to energy resource inventory, consumption pattern, energy technologies, and other relevant socio-economic parameters.
vi. Instituting an accelerated and effective manpower renewable energy and energy efficiency development programme.

5.2. Policy Implementation

In line with international best practice, policy implementation requires annual action plan based on available public and private funding. Various instruments including economic measures, information and education, legislative measures and institutional arrangements need to be used.

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

5.3 Targets/Milestones and Timelines

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

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

5.3.1 Renewable Energy

Nigeria has envisioned growing its economy at a rate of 11% - 13% so that it can be reckoned within the largest economies in the world by 2020. Energy demand and supply studies conducted by the Energy Commission of Nigeria under various growth scenarios (7%, 10%, 11.5% and 13.5%) and taking into consideration the economic vision, demography, available energy resources and modern developmental path, using MAED and MESSAGE energy planning models of IAEA, has indicated that huge amount of energy in the form of electricity, fuel and heat would be required to meet this vision. The contribution of renewable energy towards the

realization of these targets based on 7% growth scenario is presented through the following renewable energy programmes with targets and timelines:

Table 5.3.1: Hydropower Programme Targets

S/N	Activity/Item	Timeline/Quantity		
		Short Term (2015)	Medium Term (2020)	Long Term (2030)
1	Large Hydropower (MW)	2,121	4,549	4,627
2	Small Hydropower (MW)	140	1,607	8,174
	Total (MW)	2,261	6,156	12,801

Table 5.3.2: Biomass Programme Targets

S/N	Activity/Item	Timeline/Quantity		
		Short Term (2015)	Medium Term (2020)	Long Term (2030)
1	Biomass Electricity(MW)	5.0	57	292
2	Biofuel (ML/day)*			
	- Bio ethanol (E10)	5.3	9.7	24.2
	- Biodiesel (B20)	2.0	3.4	11.7

***Based on 7% Growth rate Supply Projections of PMS and AGO**

Table 5.3.3:Solar Electricity Programme Targets

S/N	Activity/Item	Timeline/Quantity		
		Short Term (2015)	Medium Term (2020)	Long Term (2030)
1	Solar (All PV and Solar Thermal Systems inclusive)	117	1,343	6,831

Table 5.3.4: Wind Programme Targets

S/N	Activity/Item	Timeline/Quantity		
		Short Term (2015)	Medium Term (2020)	Long Term (2030)
1	Wind Electricity (MW)	55	631	3,211
2	Windmill Water Pumping Systems (No.)	20	100	200

Table 5.5.5: Summary of Renewable Electricity Targets

S/N	Resource	2012	Short Term (2015)	Medium Term (2020)	Long Term (2030)
1	Hydro (LHP)	1,938.00	2,121.00	4,549.00	4,626.96
2	Hydro (SHP)	60.18	140.00	1,607.22	8,173.81
3	Solar	15	117.00	1,343.17	6,830.97
4	Biomass	-	55.00	631.41	3,211.14
5	Wind	10	50.00	57.40	291.92
	All Renewables plus LHP	1,985.18	2,438.00	8,188.20	23,134.80
	All Energy Resources(On-grid power plus 12,500MW of self-generated power)	21200**	24,380**	45,490**	115,674**
	% of Renewables plus LHP	23%	10%	18%	20%
	% RE Less LHP	0.80%	1.30%	8%	16%

***From Supply projections based on 7% GDP Growth**

****Supply projections are based on the addition of on-grid power, and a base capacity of 12,500MW of self-generation (i.e. power generated for own use) including off-grid generation from year 2012 to 2030.**

5.3.2: Energy Efficiency

The global goal or target for energy efficiency set in the Sustainable Energy for All Initiative is doubling the rate of improvement in energy efficiency. This implies increasing the current pace of energy efficiency improvement in all sectors of the nation's economy to 2.5 percent per year, achieving a 40 percent reduction in the amount of energy consumption by 2030, measured in terms of energy intensities. For us as a nation, specific targets may include:

- Production of guidelines on all the key components of energy efficiency by 2020;
- Enactment of all relevant legislation required for policy implementation by 2020;
- Attain replacement of 40% (by 2020) and (by 2030) of old and inefficient appliances in Nigeria with energy efficient appliances;
- Sustain best energy efficiency practices beyond 2030

5.4 Renewable Energy and Energy Efficiency Incentives

There are key factors that are critical to the effectiveness of any renewable energy or energy efficiency policy without which the likelihood of success in implementation is little to none. The Federal Government shall encourage commercially viable investment options for the purposes of development of the renewable energy and energy efficiency sub-sectors, and each project shall be entitled to all existing benefits and incentives available to all conventional (large hydro or thermal fossil fuels) projects. The Government will also facilitate access to all valuable conventional financing and investment projects as announced from time to time; and shall further strengthen existing mechanism for accessing rural electrification funds or such other fund as may be established for that purpose.In addition, Nigeria being a signatory to Kyoto Protocol, the Government shall encourage renewable energy and energy efficiency projects to apply for procuring carbon credit through the Federal Ministry of Environment. The Ministry of Environment or any designated authority shall coordinate market access and facilitate the trading in carbon credit and the revenue generated through the sale shall be exempted from income tax or duty. The Ministry of Environment or its designated representative will assist in the development of local CDM capacities as well as carrying out CDM promotion and awareness in renewable energy and energy efficiency sub-sectors.

The Government shall also ensure the following:

i. A clear and realistic economic instrument with appropriate target year and renewable electricity goal to guide the activities of Power Generating Companies (GenCos), Electricity Distribution Companies (DisCos), the Bulk Trader, the Market Operator, the Ministry of Power, NERC, other MDAs, financial institutions, foreign and domestic investors, non-governmental organisations (NGOs), development partners and donors, and others.
ii. Public Benefits Fund (PBF) based on penalties of companies not meeting standards with a portion of the tariff designed to support renewables.
iii. Incentives such as:
    a. Appropriate economic instrument, that will allow generators of renewable energy to obtain preferred pricing and rates as they sell,

b. Power Production Tax Credit (PTC),
c. Generation Disclosure Requirement (GDR),
d. Tax incentives to manufacturers of renewable energy and energy efficient equipment and their accessories to promote wide spread use including- (i) five year tax holiday for manufacturers from date of commencement of manufacturing; (ii) five year tax holiday on dividend incomes from investments on domestic renewable energy sources;
e. Incentives for importers to offer energy efficient appliances and lighting through exemption from excise duty and sales tax; free custom duty for two (2) years on the importation of equipment and materials used in renewable energy and energy efficiency projects; and provision of soft loans and special low interest loans from power sector development fund for renewable energy supply and energy efficiency projects.
f. Governments (Federal/States) shall assist in allocation or grant of land to manufacturers of energy efficient products and renewable energy projects
g. Provision of a defined incentives for home owners to install energy efficient appliances and lighting;
h. Introduction of tax credits for home owners who install energy efficiency appliances and lighting.
i. Tax credits to companies who produce such appliances and fixtures.
j. Grants to communities to spur the adoption of community-based renewable energy processes.

iv. Federal Government budgetary backing to support the activities of key players in the implementation of a Renewable energy and Energy Efficiency Policy (REEEP), including research, development and required feasibility studies.

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

5.5 Renewable Energy and Energy Efficiency Action Plans

The Nigerian energy policy has already identified the need for a renewable energy and energy efficiency policy as well as indicated why such a policy is important and required by Nigeria. However, since renewable energy came to the Nigerian landscape at least ten (10) years ago, the nation is yet to adopt a strategic Nigeria-centric policy that has any substance. Additionally, key partners in the realization and implementation of policy have not been held fully accountable for a timely and coordinated development and implementation of a Renewable Energy and Energy Efficiency Policy (REEEP).

Policy strengthening and strategy articulation represent the first step in moving forward. It is essential to task all relevant agencies to do their part and compel them to swiftly implement specific items tasked to them. Therefore, with Presidential backing, the Minister of Power shall develop a task list from items in this policy for each Ministry, Department and Agency to

implement. He shall also empanel a watchdog group to coordinate these activities, amongst other assignments. The process shall, following the ECOWAS Policies on renewable energy and energy efficiency, produce two products within next 6 to 12 months: (a) National Renewable Energy Action Plan (NREAP) and (b) National Energy Efficiency Action Plan (NEEAP). These action plans, along with rearticulated objectives, policies and strategies and an Integrated Resource Plan for electricity (IRP) will serve as basis for a Revised National Policy on Renewable Energy and Energy Efficiency to be completed within a year from the approval.

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

i. The development of a National Renewable Energy Action Plan (NREAP) to be completed within 6 to 12 months of the adoption of this document,
ii. The development of a National Energy Efficiency Action Plan (NEEAP) to be completed within 6 to 12 months of the adoption of this document,
iii. The Preparation of a 15-20 year integrated energy resource plan (IRP) that will include NREAP and NEEAP components,
iv. The creation and empanelling of a Monitoring and Evaluation watch dog group from a consortium of stakeholders to achieve the following:
    a. Monitor the development of NREAP and NEEAP for 12 months,
    b. Develop Monthly Progress Reports,
    c. Declare a renewable energy and energy efficiency (RE-EE) 2030 benchmark.
    d. Prepare a 15-20 year integrated energy resource plan (IRP) that includes NREAP and NEEAP components to be completed within 12 months of the adoption of this policy.
    e. Ensure that the NREAP and NEEAP pass a benefit/cost test.
    f. Long-term monitoring and reporting of accomplishments in renewable energy and energy efficiency.
    g. Long-term advocacy for renewable energy and energy efficiency targets.
v. The creation of (along with the Minister of Finance and other entities that are involved in the budgetary process):
    a. Adequate budgetary provisions should be made annually for the watchdog group to operate as required by this policy
    b. A long-term energy efficiency fund to support local government, community and household initiatives;
    c. A reasonable budget to support all other activities needing government budgetary allocation in the National Policy on Renewable Energy and Energy Efficiency.

5.5.1 National Renewable Energy Action Plan (NREAP)

The National Renewable Energy Action Plan (NREAP)will be a comprehensive document based on the cooperation of all relevant stakeholders. It will provide a detailed roadmap of how Nigeria expects to reach its targets for development of the renewable energy sector and incorporation of renewable energy in energy mix. This action plan is to set out energy benchmarks on the status quo, will propose sectorial targets, the technology mix expected to be used, the trajectory to

follow and the measures and reforms that will be developed to overcome the barriers to developing renewable energy. The NREAP will set target year and interim target year, quotas for renewable energy as well as define incentives such as FIT, RPS, PBF, Power PTC, etc. This document should be completed within six (6) to Twelve (12) months of the adoption of this policy.

NERC and other relevant agencies will work with the Monitoring and Evaluation Watchdog Group to define penalties and modalities for instance of the FIT, PBF, etc, to recommend to the Honourable Minister of Power. Under this directive, NERC will complete this action within its regular tariff review system. The Renewable Energy Action Committee within the Monitoring and Evaluation Watchdog Group will be responsible for delivering NEEAP.

5.5.2 National Energy Efficiency Action Plan (NEEAP)

The NEEAP is intended to set energy savings targets and propose concrete measures and actions that would contribute to meeting the targets. This action plan will set an overall national indicative savings target to be achieved and measured at a specified target year as well as an intermediate national indicative savings target and target year. This document is expected to be completed within 6 to 12 months of the adoption of this policy and submitted to the Honourable Minister of Power. The Energy Efficiency Task Force within the Monitoring and Evaluation Watchdog Group will be responsible for delivering NEEAP.

5.6 Monitoring and Evaluation

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

5.7 Special Customs Clearance of RE and EE Equipment

To further facilitate the implementation of the incentives relating to imports and exports, this policy recommends that the Federal Ministry of Finance should establish a Special Task Force within the Nigerian Customs Service for the renewable energy and energy efficiency sub-sectors.

The role of the Task Force in the development of the RE and EE sub-sectors will be such that specific mandate is given to the unit under the direct supervision of the Comptroller General to fast track screening of RE and EE components coming into and out of the country. The Task Force will work within the customs service to stream-line the cumbersome process inherent in importing RE and EE goods into the country. It will train staff on product quality and how to apply the various incentives as well as develop a special HS-Code (Harmonized System Code) for the sector.

6. Conclusion

The renewable energy and energy efficiency policies for the provision of electricity and their targets and timelines in the short, medium and long terms are provided. Specific policies, objectives and strategies for renewable energy and energy efficiency for the electricity sector are clearly stated in this policy document. These policies when fully implemented would facilitate the attainment of the targets within the timelines. Incentives for the promotion of renewable energy and energy efficiency are also articulated as well as the targets. It is projected that renewable electricity is to contribute about 20% of the total national electricity supply mix in the long term. Similarly, energy efficiency and conservation best practices will continue to form the cornerstone in meeting the nation's energy needs for the attainment of the Vision 20-2020 and beyond.