

Energy, Renewable Energy and the Development of Nigeria

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Abstract

The availability of energy services is an enormous challenge facing Nigeria. It is fundamental for socioeconomic development and poverty eradication. Seventy percent of the Nigerian population does not have access to electricity. The paper discussed energy, renewable energy, and the development of Nigeria. Historical and case study designs were adopted. The doctrinal method was used in data collection. The primary sources of data were the Electric Power Sector Reform Act, 2005, and the Captive Energy Generation Regulations 2008; sources of secondary data were journal articles, published and unpublished work, seminar papers, and newspapers. Data were content-analysed and presented thematically. The study revealed that energy policy interventions, which can make a major contribution to the sustainable economic, environmental, political, agricultural, scientific, educational, and social development in Nigeria, were not adequately carried out and implemented in the country. Energy efficiency led to important social benefits, such as reducing the energy bills for poor households. Implementation of the country's renewable energy target will have significant costs. It concluded that energy is important for human and developmental growth in Nigeria. The adequacy of energy in all parts of the country will reduce poverty and bring more investors to the country. The paper recommended that the relevant laws relating to energy in Nigeria as to private participation in the energy sector be utilised. The rural areas in the country be electrified and renewable energy be given wider publicity with a view to encourage it in lieu of non-renewable energy.

Keywords: Energy, Sustainable Development, Nigeria, Renewable Energy, Consumption.

Introduction

It is not news that energy plays the most vital role in the economic growth and development of a nation. Uninterrupted energy supply is a vital issue for all countries today (Energy Commission of Nigeria (ECN), 2006). The standard of living of a given country can be directly related to the per capita energy consumption. The per capita energy consumption is a measure of the per capita income as well as a measure of the prosperity of a nation (Martinot & McDom, 2002)

The growth and development of any country depend on the availability of power supply. It follows therefore that the insufficient power supply in Nigeria contributed to the backwardness of the country in terms of energy available, economic, social, political, agricultural, and a host of others. The study hereby views and reviews the availability of energy in Nigeria.

Energy supports the provision of basic needs such as cooked food, a comfortable living temperature, lighting, the use of appliances, piped water or sewerage, essential health care, educational aids, communication, and transport. Lack of access to energy contributes to poverty and deprivation and can contribute to economic decline (Awosika, 1995)

Nigeria has been experiencing an energy crisis for over two decades and it has contributed to the incidence of poverty by paralysing industrial and commercial activities. The Council for Renewable Energy of Nigeria estimates that power outages brought about a loss of 126 billion naira annually (Iwayemi, 2008).

Nigeria consumed 8,771,863 tons of oil equivalent. This is equal to about 180,000 barrels of oil per day. Oil consumption in Nigeria has increased. The effect of this increase on the economy relying solely on revenue from oil is tremendous. The Department for Petroleum Resources reported an amount of petroleum of more than 78% of the total energy consumption in Nigeria. In the present predicament as a nation, it is obvious that depending mainly on fossil fuels is not enough to meet the energy needs of the country. Nigeria is blessed with abundant renewable energy resources such as hydroelectric, solar, wind, tidal, and biomass, there is a need to harness these resources and chart a new energy future for Nigeria (Ajayi & Ajanaku, 2007) In this regard, the government has a responsibility to make renewable energy available and affordable to all (National Bureau of Statistics (NBS), 2007)

Theoretical/Conceptual Framework

Richard Auty in 1993 used resource curse theory to describe how countries rich in mineral resources were unable to use that wealth to boost their economies and how, counter-intuitively, these countries had lower economic growth than countries without an abundance of natural resources. The theory helps the study by emphasising that Nigeria must ensure the promotion and development of renewable sources of energy through coherent legal framework that protect and prioritise her social, economic, agricultural, technology and environmental interests to meet the current need as well as preserving the same for future generation's needs. Nigeria must ensure that her extractive resources do not promote under development and other crises associated with resources rich countries such as mass poverty and poor social infrastructures (Ajomo, 2001).

It highlights the need to conserve and protect the Nigeria's extractive resources for posterity needs. It also highlights the need to enhance social and economic development of Nigeria through her abundant petroleum resources for energy sustainability and for the benefits of her citizens (Olujobi & Olujobi, 2020).

The theory helps mitigating the effects of climate change through consistent enforcement of the extant legal framework on energy in all developing petroleum exporting states. It emphasises that those resources abundant countries are largely suffering from poor economic growths (Akinyetun, 2016). The theory further emphasis that resources wealthy countries lack economic prosperity and developments that commensurate with their abundant petroleum resources due to prevalent violent, corruption, failure to diversify their economies and natural resources to other natural endowments such as agriculture, solid

minerals among others to enhance their industrial developments to combat their various environmental challenges (Akinrele, 2016).

It gives reasons for resources rich countries underdevelopment due to failure to diversify timely and the prevalence of corruption in the nations (Olujobi, 2018). There is therefore the need for stringent enforcement of its extant laws on transparency in the extractive industries and other environmental laws to protect social, economic and other environment interests in the sector (Oyewunmi & Olujobi, 2015).

Energy Situations in Nigeria

Nigeria produces the highest quantity of oil in Africa, which, along with Libya, accounts for two-thirds of Africa's crude oil reserves. Most of Africa's bitumen and lignite reserves are found in Nigeria. A large deposit of bitumen is located at Agbabu in Irele Local Government Area of Ondo State. In its mix of conventional energy reserves, Nigeria is simply unmatched by any other country on the African continent. It is not surprising, therefore, that energy export is the mainstay of the Nigerian economy. In addition, primary energy resources dominate the nation's industrial raw material endowment (Adeyemo, 2001).

Nigeria possesses the world's sixth-largest reserve of crude oil. The country has an estimated oil reserve of 36.2 billion barrels. It is increasingly an important gas province with proven reserves of nearly 5,000 billion m³. The oil and gas reserves are mainly found and located along the Niger Delta, Gulf of Guinea, Lake Chad, and the Bight of Bonny (Oyedepo, Babalola, Nwanya, Kilanko, Lerado, Aworinde, Adekeye, Oyebanji, Abidakun, & Agbereghe, 2018). Most of the exploration activities are focused on deep and ultra-deep offshore areas with planned activities in the Chad basin, in the northeast. Coal and lignite reserves are estimated to be 2.7 billion tons, while tar sand reserves represent 31 billion barrels of oil equivalent. The identified hydroelectricity sites have an estimated capacity of about 14,250 MW. Nigeria has significant biomass resources to meet both traditional and modern energy uses, including electricity generation (Sambo, Iloeje, Ojosu, S. Olayande & Yusuf, 2006).

The situation in the rural areas of the country is that most end users depend on fuel wood. Nigeria consumes over 50 million tons of fuel wood annually, a rate that exceeds the replenishment rate through various afforestation programs. Sourcing fuel wood for domestic and commercial uses is a major cause of desertification in the arid-zone states and erosion in the southern part of the country. The rate of deforestation is about 350,000 per year (Akinbami, (2001).

The rural areas, which are generally inaccessible due to the absence of good road networks, have little access to conventional energy such as electricity and petroleum products. The daily needs of the rural populace for heat energy are therefore met almost entirely from fuel wood. The sale of fuel wood and charcoal is mostly uncontrolled in the unorganised private sector. The sale of kerosene, electricity, and cooking gas is essentially influenced and controlled by the Federal Government or its agencies (Oke, 2013). The policy of the Federal

Government had been to subsidise the pricing of locally consumed petroleum products, including electricity. In a bid to make the petroleum downstream sector more efficient and to stem petroleum product consumption as a policy focus, the government has reduced and removed subsidies on various energy resources in Nigeria. The present administration in Nigeria has disclosed that fuel subsidies will be completely removed. The various policy options have always engendered price increases in the products (United Nations, 1993)

Energy Consumption in Nigeria

Energy consumption patterns in the world today show that Nigeria has the lowest rates of consumption. The country suffers from an inadequate supply of usable energy due to the rapidly increasing demand, which is typical of a developing economy. Nigeria is potentially endowed with sustainable energy resources. The household sector accounts for the largest share of energy usage in the country. This is largely due to the low level of development in all the other sectors (Sambo, 2009).

The predominant energy resources for domestic and commercial uses in Nigeria are fuel wood, charcoal, kerosene, cooking gas, and electricity. Others are sawdust, agricultural crop residues of corn stalks, cassava sticks, and, in extreme cases, cow dung. In Nigeria, among the urban dwellers, kerosene and gas are the major cooking fuels. Most people rely on kerosene stoves for domestic cooking, while only a few use gas and electric cookers (Adeyemo & Odukwe, 2008)

The rural areas have little or no access to conventional energy such as electricity and petroleum products due to the absence of good road networks. Petroleum products are purchased in rural areas at prices very high more than their official pump prices. The gross domestic product (GDP) and per capita income are indices that are used to measure the economic well-being of a country and its people. GDP is defined as the total market value of all final goods and services produced within a given country in each period. The per capita income refers to how much everyone receives, in monetary terms, of the yearly income that is generated in his/her country through productive activities (Omorogbe, 2008). That is what each citizen would receive if the yearly income generated by a country from its productive activities were divided equally between everyone (CBN, 2006).

Current Electricity Situation in Nigeria

The electricity system in Nigeria centers on the Power Holding Company of Nigeria (PHCN), which accounts for about 98% of the total electricity generation. Power generation by other agencies such as the Nigerian Electricity Supply Company relies on thermal power for electricity generation unlike PHCN, which relies on both hydro- and thermal power. However, electricity is also a consumer of fuel and energy such as fuel oil, natural gas, and diesel oil. The importance of these sources of energy and fuel for generating electricity has been decreasing in recent years. However, hydropower which is relatively cheaper than these sources has grown to be more important than other sources. However, more recently,

the power authority has generated electricity through a mix of both thermal and hydro systems. All the power, distribution, and substations are specially interlinked by a transmission network popularly known as the national grid. The entire electricity generated nationwide is pooled into the National Control Centre, Osogbo, from where electricity is distributed to all parts of Nigeria (Ohunakin, 2010).

The national electricity grid presently consists of 14 generating stations with a total installed capacity of about 8,039 MW. The transmission network is made up of 5,000 km of 330-kV lines, 6,000 km of 132-kV lines, and 23 of 330/132-kV substations, with a combined capacity of 6,000 or 4,600 MVA at a utilisation factor of 80%. In turn, 91 of 132/33-kV substations have a combined capacity of 7,800 or 5,800 MVA at a utilization factor of 75%. The distribution sector is comprised of 23,753 km of 33-kV lines, 19,226 km of 11-kV lines, and 679 of 33/11-kV substations. There are also 1,790 distribution transformers and 680 injection substations (Energy Commission of Nigeria (ECN, 2007).

The Nigerian Energy Challenge

Nigeria's energy need is on the increase, and its increasing population is not adequately considered in the energy development program. The present urban-centered energy policy is deplorable, as cases of rural and sub-rural energy demand and supply do not reach the center stage of the country's energy development policy. People in rural areas depend on burning wood and traditional biomass for their energy needs, causing great deforestation, emitting greenhouse gases, and polluting the environment, thus creating global warming and environmental concerns. (Sagay, 2005). The main task has been to supply energy to the cities and various places of industrialisation, thereby creating an energy imbalance within the country's socioeconomic and political landscapes. Comparing the present and ever-increasing population with the total capacity of the available power stations reveals that Nigeria is not able to meet the energy needs of the People Council for Renewable Energy, Nigeria (CREN), 2009).

Energy Demand Projection

There is an increasing demand for fuel energy due to the increase in economic development and civilisation all over the world. The population projection of Nigeria was expected to grow from 115.22 million in 2000 to 281.81 million by 2030 at an average annual rate of 2.86% between 2000 and 2030.

The electric power capacity demand by projection in Nigeria is approximately 3.5-fold between 2010 and 2020 and 7.5-fold between 2010 and 2030, respectively, at a growth rate of 7%, while the projected supply by fuel mix shows a similar trend with the demand at both growth rates of 7% and 13%. There is a wide disparity in the energy demand to the supply ratio in Nigeria both in the present and the future. This necessitates an urgent need for alternative energy sources and efficient energy usage to avert looming energy crises (IEA, 2020).

These projections for continued rapid energy growth imply some severe problems for future resource depletion, energy degradation, associated environmental problems, fuel shortage, etc. Indeed, many of these problems are already happening; thus, energy conservation is concerned with ways to reduce energy demand but achieve the same objective as before (Lund, & Toth, 2020)

To achieve its objective of sustainable development, Nigeria needs to substantially increase the supply of modern affordable energy services to all its citizens while, at the same time, maintaining environmental integrity and social cohesion. In addition, a robust mix of energy sources (fossil and renewable), combined with improved end-use efficiency, will almost certainly be required to meet the growing demand for energy services in the country. Technological development, decentralized non-grid networks, diversity of energy-supply systems, and affordable energy services are imperative to meeting future demand (Iyayi, 2004).

The Role of Renewable Energy Technologies in Sustainable Development

Renewable energy has an important role to play in meeting future energy needs in both rural and urban areas. The development and utilisation of renewable energy should be given a high priority, especially considering increased awareness of the adverse environmental impacts of fossil-based generation (Monday & Salihu, 2017). The need for sustainable energy is rapidly increasing in the world. Widespread use of renewable energy is important for achieving sustainability in the energy sectors in both developing and industrialized countries (REN21, 2020).

To seize the opportunities presented by renewable energy resources in sustainable development, Nigeria needs to establish renewable energy markets and gradually develop experience with renewable energy technologies. The barriers and constraints to the diffusion of renewable energy should be overcome (OECD, 2020). A legal, administrative, and financing infrastructure should be established to facilitate the planning and application of renewable energy projects. Government must play a useful role in promoting renewable energy technologies by initiating surveys and studies to establish their potential in both urban and rural areas. Renewable energies are constantly being replenished from natural resources, they have the security of supply, unlike fossil fuels, which are negotiated on the international market and subject to international competition, sometimes even resulting in wars and shortages (REN21, 2019).

Their rate of use does not affect their availability in the future; thus, they are inexhaustible. The resources are generally well distributed all over the world, even though wide spatial and temporal variations occur (Doran, 2002). Thus, all regions of the world have reasonable access to one or more forms of renewable energy supply. They are clean and pollution-free and are therefore a sustainable natural form of energy. They can be cheaply and continuously harvested and are therefore a sustainable source of energy (IEA, 2020).

Unlike the nuclear and fossil fuels plants which belong to big companies, governments, or state-owned enterprises, renewable energy can be set up in small units and is therefore suitable for community management and ownership. In this way, the returns from renewable energy projects can be kept in the community. In Nigeria, this has relevance since the electricity grid does not extend to remote areas, and it is prohibitively expensive to do so. This presents a unique opportunity to construct power plants closer to where they are needed. In this way, much needed income, skill transfer, and manufacturing opportunities for small businesses would be injected into rural communities (Ibitoye & Adenikinju, (2007).

Energy and Sustainable Development in Nigeria

Sustainable energy involves the provision of energy services in a sustainable manner, which in turn necessitates that energy services be provided for all people in ways that, now and in the future, are sufficient to provide the necessities, affordable, not detrimental to the environment, and acceptable to communities and people. Linkages between sustainable energy and factors such as efficiency and economic growth have been investigated (IEA, 2020).

The energy sector plays a pivotal role in attempts to achieve sustainable development, balancing economic and social developments with environmental protection. Energy is central to practically all aspects of sustainable development. This characterisation of energy directs our attention to its sources in nature, to activities that convert and reconvert this energy, and finally to activities that use the energy to produce goods and services and household consumption. Traditionally, energy is treated as an intermediate input in the production process (EHPA, 2020).

Economies that have replaced human and animal labour with more convenient and efficient sources of energy and technology are also the ones that have grown the fastest. No country in modern times has succeeded in substantially reducing poverty without adequately increasing the provision and use of energy to make material progress. Indeed, by not ensuring minimum access to energy services for a broad segment of the population, the economic development of developing countries such as Nigeria beyond the level of subsistence has proven to be a challenge (Eurostat, 2019).

Energy has also strong and important links to the environment. Many energy sources are drawn directly from the environment, requiring sound management for these sources to be sustainable. Furthermore, energy use affects the environment. Emissions from fossil fuels, for example, reach beyond the local and national levels to affect the global environment and contribute to climate change. The poorest people often live in the most ecologically sensitive and vulnerable physical locations. These areas may be the most affected by the predictable effects of climate change such as an increased frequency of extreme events, for example, floods, drought, rising sea levels, and melting ice caps. The risks facing poor

people are often increased by the unsustainable use of biomass resources (Ramchandra & Boucar, 2011).

The connection between energy, the environment, and sustainable development is worth highlighting. Energy supply and use are related to climate change as well as such environmental concerns as air pollution, ozone depletion, forest destruction, and emissions of radioactive substances. A society seeking sustainable development should use only energy resources, which have no environmental impact. However, since all energy resources lead to some environmental impact, improved efficiency and environmental stewardship can help overcome many of the concerns regarding the limitations imposed on sustainable development by environmental emissions and their negative impacts (Ramchandra & Boucar, 2011).

Energy resources, whether carbon-based or renewable, are obtained from the environment, and wastes from energy processes are typically released into the environment. Given the intimate ties between energy and the key components of sustainable development, the attainment of energy sustainability is being increasingly recognised as a critical aspect of achieving sustainable development (Energy Commission of Nigeria (ECN), 2008).

The use of renewable natural resources, combined with efficient supply and use of fossil fuels with cleaner technologies, can help reduce the environmental effects of energy use and help Nigeria replace the existing, inefficient fossil fuel technologies that pollute the environment. As a complementary measure, careful management of energy resources is important to promote economic growth, protect ecosystems and provide sustainable natural resources (Rai, 2004).

Thus, energy sustainability is considered to involve the sustainable use of energy in the overall energy system. This system includes processes and technologies for the harvesting of energy sources, their conversion to useful energy forms, to provide energy services such as operating communications systems, lighting buildings, and cooking (Onyebuchi, 1989). The reform of the energy sector is critical to sustainable development in Nigeria. This includes reviewing and reforming subsidies, establishing credible regulatory frameworks, developing policy environments through regulatory interventions, and creating market-based approaches such as emission trading. Globally, countries are developing strategies and policies to enable the sustainable development of their energy resources, thus contributing to fuel economic and social developments, while reducing air pollution and greenhouse gas emissions (PHCN, 2008).

The energy sector is strategic to the development of the Nigerian economy. In addition to its macroeconomic importance, it has major roles to play in reducing poverty, improving productivity, and enhancing the general quality of life. If Nigeria is to take the path of sustainable energy, it is important to accurately and technically model the energy demand and supply scenarios and their impacts on the economy, resources, and society along with

the environment, for both the medium and long-term. From such analyses, we can derive information that is vital for policy construction and investment (Karekezi, 1997).

Energy Efficiency and Energy Conservation in Sustainable Development

Energy efficiency means an improvement in practices and products that reduce the energy necessary to provide services. Energy efficiency products essentially help to do more work with less energy. Energy efficiency is also defined as essentially using less energy to provide the same service. In this sense, energy efficiency can also be thought of as a supply of resources - often considered an important, cost-effective supply option. Investment in energy efficiency can provide additional economic value by preserving the resource base and mitigating environmental problems (Williams, 1998).

Energy efficiency improvements have multiple advantages, such as the efficient exploitation of natural resources, the reduction in air pollution levels, and lower spending by consumers on energy-related expenditures (Uyigue (2007). Energy use has environmental impacts, regardless of the source or mechanism. For example, hydroelectric projects affect their local ecological systems and displace long-standing social systems. Fossil fuel power creates pollution in the extraction, transportation, and combustion of its raw materials. The long-term storage of waste products of the nuclear power industry is an issue to be resolved. Cost-effective energy efficiency is the ultimate multiple pollutant reduction strategy (Winkler, 2006).

A lot of energy is wasted because households, public and private offices, as well as industries, use more energy than is necessary to fulfill their needs. One of the reasons is that they use outdated and inefficient equipment and production processes. Unwholesome practices also lead to energy wastage (PHCN, 2009).

Energy conservation and energy efficiency are separate but related concepts. Energy efficiency is achieved when energy intensity in a specific product, process, or area of production or consumption is reduced without affecting output, consumption, or comfort levels. The promotion of energy efficiency will contribute to energy conservation and is therefore an integral part of energy conservation promotional policies (Dayo, 2008).

Energy efficiency encompasses conserving a scarce resource; improving the technical efficiency of energy conversion, generation, transmission, and end-use devices; substituting more expensive fuels with cheaper ones; and reducing or reversing the negative impact of energy production and consumption activities on the environment (Famuyide, Adu & Ojo, 2004), Energy conservation is a tangible resource by itself that competes economically with contemporary energy supply options. In addition to this, it offers a practical means of achieving four goals that should be of high priority in any nation that desires quick and sustainable economic growth and development (Winkler & Van, 2007. It enhances the international competitiveness of industries in the world markets by reducing the cost of production (Adeyemo & Odukwe, 2008). It optimizes the use of capital resources by directing lesser amounts of money to conservation investment as compared

with capital-intensive energy supply options. It protects the environment in the short run by reducing pollution and in the end by reducing the scope of global climate change. It strengthens the security of supply through a lesser demand and a lesser dependence on petroleum product imports. No energy supply option may be able to provide all these benefits (Emeka, 2010). Energy conservation is a decentralised issue and is largely dependent on individual, distinct decisions of energy supply, which are highly centralized ((DPR), 2007. The housewife, the car driver, the housing developer, the house owner, the boiler operator in industry, and every other individual who consumes energy in some form or another is required to participate in energy-saving measures. It calls for a collective endeavor and is dependent upon the actions of people in diverse fields although the people involved may not be sufficiently informed or motivated to conserve energy (SECCP, 2002).

Renewable Energy and Energy Efficiency as Climate Change Mitigation Strategies

The Inter-government Panel on Climate Change (IPCC), a body set up in 1988 by the World Meteorological Organization and the United Nations Environmental Programme to provide authoritative information about the climate change phenomenon, asserts that the warming of the last 100 years was unusual and unlikely to be natural in origin (CBN, 2009). The IPCC has attributed the warming of at least the second half of the century to an increase in the emission of greenhouse gases into the atmosphere. Human activity is largely responsible for the emission of these gases into the atmosphere: CO₂ is produced by the burning of fossil fuels (coals, oil, gas) as well as by land-use activities such as deforestation; methane is produced by cattle, rice agriculture, fossil fuel use, and landfills; and nitrous oxide is produced by the chemical industry, cattle feed lots, and agricultural soils. As humans have increased their levels of production and consumption, greenhouse gas emissions have also increased; since 1750, at the time of the industrial revolution, CO₂ emission has increased by 31%, methane by 15%, and nitrous oxide by 17% (UNIDO, 2001).

The Clean Development Mechanism (CDM) was integrated into the Kyoto Protocol as the United Nations Framework Convention on Climate Change. CDM projects allow investment by entities from industrialized countries into projects in developing countries. In return for this investment, carbon credits (in this case, certified emission reductions) are received by the investor in the industrialised country (Adenikinju, 2005). This enables the industrialized country to meet its emission reduction targets given by the Kyoto Protocol more cost-effectively while promoting sustainable development in developing countries. CDM projects may also be unilateral, i.e., they take place in a developing country without a project partner from an industrialized nation (Dubin & Long, 1980).

Investment in clean energy facilities is recognised as the best way to increase the participation of Nigerian proponents in the CDM process and hence the global carbon market. Clean energy investment is defined as follows: investment into an energy supply and utilisation system that provides the required energy with minimal negative environmental and social consequences (Abiodun, 2003). Investment into clean energy

systems can also be viewed as an investment into energy sources and technologies that are significantly less environmentally damaging than in the *status quo* case. Investment in clean energy systems provides the most effective and optimally efficient path to increased CDM participation in Nigeria and hence effective participation in the global carbon market (Ashong, 2001).

Conclusions and Recommendations

In Nigeria, it is very clear that the energy demand is very high and is increasing geometrically while the supply remains insufficient, insecure, and epileptic and is decreasing with time; fossil resources, which are being depleted despite not being environmentally non-friendly, have hitherto dominated the society. The energy supply mix must thus be diversified through installing an appropriate infrastructure and creating full awareness to promote and develop the abundant renewable energy resources present in the country as well as to enhance the security of supply.

The opportunities for conserving energy in our various sectors, office building and residential areas, manufacturing industries, transportation, electricity generation and distribution, and electrical equipment and appliances. The various areas where savings in energy can be made have also been identified. Several guidelines and measures have been suggested to conserve energy in these areas, and if the guidelines and measures are strictly adhered to, then substantive savings in energy will be carried out.

The paper recommended that the Nigeria government should do the following:

- i. develop policies on energy efficiency and integrate them into the current energy policies. A comprehensive and coherent energy policy is essential in guiding the citizens toward an efficient usage of its energy resources,
- ii. promote energy-efficient products and appropriate practices on the side of the end users and energy generation. Create awareness of renewable energy and energy efficiency,
- iii. allow each state of the federation to generate energy and distribute the same within the state,
- iv. carry out a resource survey and assessment to determine the total renewable energy potential in the country as well as identify the local conditions and local priorities in various ecological zones and
- v. establish a testing and standards laboratory for renewable energy technologies like that in South Africa.

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