EXPLORATION AND PRODUCTION OF SHALE OIL AS A RENEWABLE ENERGY FOR SUSTAINABLE DEVELOPMENT IN NIGERIA: NEED FOR LEGAL ALIGNMENT*

Abstract

Energy availability can be among indices used as an index in measuring a country's stability, as well as her economic and social development strides. Resources which can generate energy are available in Nigeria awaiting foray. Shale Oil which is an unconventional oil being harnessed in the United States, and extensive utilization of renewable energy. This article examined the ills of over dependence on fossil fuel and the possibility of energy generation through alternative sources such as shale oil exploration and renewable energy sources; Solar, Biomass, Hydro and Wind which are available in the country. The researchers adopted the doctrinal method of research while employing the analytical and comparative approaches. The primary and secondary sources of data collection were also resorted to through legislations, conventions, laws, case laws, and books, journal publications and policy papers respectively. We found that the aforementioned alternative source of energy development can contribute in facilitating sustainable development and contribute immensely in tackling global environmental challenges such as climate change and diversifying the country's economic source of income by making it less dependent on the vagaries of oil prices. We concluded by categorically stating that Nigeria's over dependence on a mono economy is one of the bane of her sustainable national development and diversification is a veritable source of sustainability. Recommendations were made on the need for government to take further step towards ensuring that policies on alternative sources of energy generation are given adequate legal backing which are enforceable and can encourage foreign investment in clean renewable energy. A formidable legal structure is thereby suggested in strengthening the rising potential of Renewable Energy and consideration of shale oil exploration, to meet high demands for energy especially in the area of electricity.

Keywords: Energy, Sustainable, Development, Shale oil, Renewable, Energy, Legal, Alignment

1.Introduction

Energy (which can be categorized into potential and kinetic energy) plays a vital role in the economic, socio-political and environmental sphere of every nation. In Nigeria, Energy generation depends on petroleum products and others like hydropower, biomass and coal[1]. Without energy resources, man would literally be back to Stone Age. Energy is a vital input in the process of production. Everybody needs and uses energy on a day to day basis[2]. Also energy, is an essential component of any developmental process[3] Decades of Nigeria's dependence on fossil fuels made the economy susceptible to the rise and fall of oil prices, this ought not to be, if Nigeria had viable alternative sources of income generation and other resources which provide energy. Nigeria almost totally depends on oil for its energy supply and economic survival. This accounts for majority of environmental crimes associated with its crude oil exploitation procedures[4]. Oil boom era in Nigeria and high demand for the product by other countries is fast becoming a thing of the past, as new energy exploration options such as shale oil production by countries such as United States have dwindled demand of Nigeria's sweet crude oil, which is similar to the light oil produced in United States. Shale oil output in the United States has contributed to the fall of Nigeria export of crude oil and petroleum products to the US which plunged from 36.4 million barrel in July 2010 to just 5.6 million barrel in January 2019 according to US Energy information Administration.[5]

Earlier in 2020, oil prices had fallen to almost $45 per barrel, the lowest for some years. The combination of shale oil production and sluggish global demand growth was queried.[6] Demand for oil slumped even further in recent times as a result of the outbreak of covid-19. Nigeria relies so much on crude oil for energy production and anything affecting crude oil automatically affects the economic, socio- political and environmental health of the country. Taking into consideration the recently concluded deal by Oil Producing and Exporting Countries (OPEC)

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[1]A. Anbituumi and others 'Analysis of Safety Environmental Regulations for Downstream Petroleum Industry operations in Nigeria: problems and prospect. *Environmental Development Journal* (9) 2014, 43-60.

[2] O. Onyi-Ogelle,'The Delimitation of Federal & State ownership and control of mineral oil in Nigeria' (Nigeria: Folmech Publication Co. Ltd 2011) p 5-6

[3]V. Aigbokhaevo. 'The Quest for Energy Revolution in Nigeria: The Clean Development Mechanism (CDM) as Tool for Environmental Integrity'. *University of Benin Law Journal* 14(1) 2013, p. 10

[4]Ibid

[5]N.Browning.https://www.reuters.com/article/us-nigeria-oil/squeezed-by-u-s-shale-nigerian-oil-propped-up-by-asian-demand-idUSKCN1RK0GB assessed o 10 march 2020

[6]R.A Filani https://www.theafricareport.com/24442/how-coronavirus-and-the-global-oil-price-war-can-impact-nigeria/ assessed 10 march 2020

to slash output by 9.7 million barrel a day in order to bring oil production in line with demand[7] raised questions; to wit; whether Nigeria would have a fair deal in this decision, having in mind that Nigeria depends on oil for revenue generation or whether it is her best moment of reality thus begin to seek more alternative measures to diversify the economy's income generation channels.

This article seeks to proffer alternative sources for energy generation. The idea in this case will function in the opposition to Nigeria's heavy dependence on crude oil. Consequently, energy generation will not be hampered and the beneficial diversification of the country's economy will be achieved. According to Dr Nonso Obiliki, Director at Turgot Centre for Economics and Policy Research; Nigeria has no fiscal buffers or significant foreign reserves, the impact of fall in oil prices will be significant.[8] Furthermore the researchers examined the benefits of shale oil development and alternative sources (such as renewable energy) in Nigeria as have been discovered and put to use by other countries.

2. Definition of Terms

Man needs energy for just about any type of function ranging from heating houses, industrial and agricultural processes. For a country to achieve sustainable development there must be development in all ramifications and not only in one aspect to meet the needs of all without sidelining the ecosystem. This brings about the need for alternative cleaner measures for generating energy in the light of renewable energy.

Fossil fuel

This is fuel formed by natural process such as anaerobic decomposition of buried dead organisms, originating in ancient photosynthesis such organisms and their resulting fossil fuel, typically have an age of millions of years and sometimes more than 650 million years. Fossil fuel contains high percentage of carbon which includes petroleum, coal and natural gas. Fossil fuel comes from the decayed remains of pre-historic plants and animals.

Energy

It is power derived from the utilization of physical or chemical resources, especially to provide light and heat. In physics, energy is the quantifiable property that must be transmitted to an object enabling it to execute on, or to heat the object. Carbon and hydrogen which are the elements of crude oil react with oxygen in air to produce Carbondioxide (Co_2) and water (H_20). In the process of the reaction, heat is released which further amplifies the reaction. Energy is a property of matter that can be converted into work, heat or radiation. There are many forms of energy but they can all be put into two categories; kinetic and potential energy. Electrical, radiant, thermal, motion and sound can be categorized under kinetic energy, while gravitational, nuclear, chemical energy come under potential energy. Energy sources can be classified as renewable and non-renewable energy.

Sustainable Development

This can be defined as the organizing principle for meeting the development goal while simultaneously sustaining the ability of natural systems to provide protection for the environment. It stems from our common future known as Brundtland Report. 'Sustainable development is development that meets the need of the present without compromising the ability of future generations to meet their needs'.[9] The concept of sustainable development is based on the concept of development (socio-economic development in line with ecological constraints), the concept of needs and the concept of future generation (possibility of long term usage of resources to ensure quality life for future generation).[10]

Renewable and Alternative Energy

Renewable energy is an alternative source of energy to the conventional fossil fuel. It is energy collected from renewable sources; they can be naturally replenished on a human time scale, such as sunlight, wind, rain, tides, waves and geothermal heat. It is also energy from sources that is not depleted when used, replaced rapidly by a natural process such as power generated from sun or wind. Alternative source of energy has helped in alleviating the problems of fossil fuel such as high emission rates, saving cost and reducing fuel price.

[7] See Business morning @channels tv.com 12 April 2020

[8]https://www.theafricareport.com/23079/nigeria-dependence-on-oil-revenue-underlined-by-coronavirus/ Accessed on the 11 march 2020

[9]World Commission on the Environment and Development.(WCED)See R EmasThe Concept of Sustainable Development: Definition and Defining Principles available at https://sustainabledevelopment.un.org/ content/documents/ 5839GSDR%202015_SD_concept_definiton_rev.pdf

[10] K.Tomislav ' The concept of sustainable development from its beginning to the contemporary issues 21 *Zargreb International Review of Economics and Business Journal* 2018

Shale Oil

Shale oil is an unconventional fossil fuel extracted with advanced technique such as tracking and horizontal drilling. Shale oil is produced from oil shale rock fragment by pyrolysis[11]. Extracting oil from oil shale requires conversion of the solid hydrocarbons in the rock to liquid form, so they can be pumped or processed. This is done by heating the rock to high temperature by separating and collecting the resultant liquid. This process is called retorting.

3. Types of Energy

Energy can be categorized into non-renewable and renewable energy. Examples of non-renewable energy are; natural gas, petroleum, uranium, nuclear energy. They are finite, and have been formed over time. They cannot last forever even though it took millions of years in formation. Viable renewable energy source include wave power, biomass conversion, tide power, geothermal power, wind power technology, solar application, hydroelectricity, radiant energy, compressed natural gas, and nuclear power. All these are the energy obtained from the continuous or repetitive current of energy recurring in the natural environment and or energy flows which are replenished at the same rate that they are used[12]. In Nigeria renewable energy from hydropower has actually been at the core of Nigeria's grid electricity production since 1960's and there is need for more exploration in other viable areas in Nigeria.

4. Diversification and Paradigm Shift from Dependence on Fossil for Energy

Fossil fuel is a finite resource, and its production cannot be sustained in the long term. It is therefore imperative for nations to seek alternative source of energy. In this content renewable energy presents itself as a viable alternative.[13] Energy experts envisage that oil supply may eventually become exhausted. Some estimate that the world reserve will last from 63 to 95 years. Hence attention is now being drawn to renewable energy[14]. Industries in Nigeria, consume lots of energy ranging from mining, milling, smelting followed by manufacturing users. This means that the role of energy in any society cannot be relegated; therefore there is need for alternative source of energy to meet necessary demand. For Nigeria to free herself from total dependence on fossil fuel; there is need to promote renewable energy alternatives and energy efficiency, which would require national, state, local government effort as well as legal backing for effectiveness. Even though Nigeria has abundant natural resources such as petroleum, coal, natural gas, limestone, it is not enough to depend on them solely as her main stay; in view of the fact that energy demand and utilization are permanently on the increase, population explosion is on the rise, whereas available natural resources are exhaustible. Nigeria discovered crude oil in commercial quantity first in Oloibiri in the area now called Bayelsa State in 1956 and also in Afam in Rivers State.[15] Extraction and use of fossil fuel has not been without numerous environmental challenges, which include high emission of greenhouse gases (EHG). When cleaner alternative energy resources are used, it could help in curtailing greenhouse gases emission to permissible levels. This can also help in reducing the adverse impact of climate change by drastically reducing air, water and land pollution[16].

5. Exploration Prospects of Shale Oil Development in Nigeria: Beneficial outcomes

Oil shale is a sedimentary rock found all over the world. The United States is currently known to have the most shale resources in the world. In Nigeria, oil shale deposits are located abundantly in Benue, Borno, Adamawa and Ebonyi States. There are potentials for shale gas in the Niger Delta. These are alternative energy sources, to supplement conventional hydrocarbons. United States (US) accounts for the largest oil shale in the world with 3340 billion tonnes which constitute 62% of worlds known recoverable oil shale potential[17]. US shale oil has practically run Nigeria's crude oil out of the international market thus drastically reduced Nigeria's export of crude oil to the United States[18]. Although the cost of shale oil production is seemingly higher than that of conventional oil the difference is not enough to deter interest in exploration prospects. Shale oil revolution which has taken root in the United States has shown that Nigeria cannot continue to rely on the usual oil and gas sector

[11]Pyrolysis – is a form of treatment that chemically decomposes organic materials by heat in the absence of oxygen.

[12] O. Ebiemere 'the impact of renewable energy on sustainable investment environment. *Journal of jurisprudence and contemporary issues* 9(1) 2017. P. 153

[13]L. Atsegbua et al 'Environmental Law in Nigeria theory and practice' (Nigeria: Ambik Press 2004) p. 290

[14]L. Atsegbua. 'oil and Gas Law in Nigeria theory and practice' (2nd ed Benin: New Era publication 2004) p.3

[15] V. Aigbokhaevo op cit note 3

[16] Ibid.

[17]N.A Okon and D. T. Olagunju 'Economic estimation of oil Shale Development methods in Nigeria. *Journal of scientific and Engineering Research* 4(19) 2017 pg. 397

[18]Availableat https://www.pmnewsnigeria.com/2019/08/09/bad-news-us-shale-oil-runs-nigeria's crude oil-out-of-market.

for its revenue, exports and foreign exchange earnings[19]. America produces shale oil in commercial quantities. The total shale oil production in America has reached 8.5 million barrel per day. This has placed America in the league of top oil producing countries alongside Saudi Arabia and Russia. It is projected to reach 11.6 million barrel before the end of the year 2020[20]. World reserves of oil shale are estimated to be around 600 billion tons of oil equivalent (TOE) content of shale oil and 30% of these are technically extractable. In Nigeria within the Anambra Basin, the Eze-Aku shale formation has been identified as having valuable shale gas reserves.[21] The major challenge of shale oil production in Nigeria amongst others has been absence of a standard regulatory body and legal framework like those applicable in conventional oil production. Consequently, interested investors cannot be appropriately accommodated. Most of all the laws drafted so far pertain mainly to conventional oil and gas resources. Hence the need for this paper which advocates for legal structures for effective shale oil production in Nigeria. In this connection, more attention should be diverted towards unconventional oil production for increased energy production, faster economic growth and sustainable development, and striving towards positive growth and diversification.

United States is the biggest consumer of energy worldwide and oil and gas are helping them modify their economic, global, social and political scenario thus steering their policies in the area of energy towards self-sufficiency. Shale oil production comes also with some negative impact raising environmental concerns especially with the process of extraction known as hydraulic fracturing or 'fracking'. This has in no way deterred the United States self-sufficiency goal and less reliance on importation of conventional oil to meet her very high demand of energy resources. This position of the US is relegating developing countries that rely on exportation of crude oil to the background. Buyers have almost become unavailable for the conventional oil and gas because of the situation where the US has become self-sufficient. The researchers are strongly submitting that Nigeria should develop policies and regulatory framework for shale oil production to encourage interested investors to explore the country's rich shale oil resources. A 2016 conservative estimate by world energy council set the total world resources of oil shale equivalent to yield of 6.05 trillion barrels (962) billion cubic meters recent global deposit of shale oil equivalent[22]. Shale oil revolution has succeeded in the US. They began commercial extraction of light oil including shale oil and light shale oil in the early 2000's. It is our position that Nigeria can copy the example of the US.

6. Renewable Energy: Road Map to Clean Development Mechanism and Sustainable Development

Renewable energy arises from sources that are not depleted when used. Example of such sources are; wind and solar power. These sources of energy are environmentally friendly providing an alternative and cleaner source of energy unlike fossil fuel. Advantages of renewable energy include having a cushioning effect on the environment by reducing pollution, and resources are not depleted in the process of energy generation, hence it is often referred to as clean energy. The major advantage of renewable energy is that, it's environmentally friendly and treads the path of sustainable development. Several policies, treaties, conferences, declarations place emphasis on the issue of sustainability[23], a focus which is in line with developmental process. Economic growth being a necessary factor and an ultimate goal of development planning, but the issue of sustainability should act as a necessary constraint.[24] By implication increase in energy production should not in any way jeopardize the sustainability of the environment, prioritizing the essence of sourcing for alternative, ecofriendly, and cleaner means of energy production such as renewable energy.

7. Advantages of Renewable Energy

Renewable energy saves cost. Cost of maintenance and operations are minimal. A lot of money can be conserved from using natural sources to generate energy since there is no payment for re-fuel for the use of sun, wind and other natural processes. Renewable energy is inexhaustible. Technologies of renewable energy use resources directly from the environment to generate power sources earlier mentioned e.g. wind. This cannot be said of fossil fuels which can be exhausted. Frequent maintenance might not be necessary unlike maintenance of generators which use traditional fuel sources. The panels for solar and wind turbines are fewer, and are not as difficult to

[19]V. Onyenkpa and T. Balogun 'implications of Shale oil Development and Alternative sources of energy on Nigeria's Economy. *The Gravitas Renew of Business & property law journal* 6(3)2015. Pg. 92.
[20]Ibid.
[21] Ibid
[22] O.V Ojo 'An overview of the Legal and Regulatory framework for Renewable Energy projects in Nigeria: Challenges and Prospects 1(1) Unilag Law Review 2017.
[23]World commission of environment and Development (WCED 1998) which stresses the need for sustainability having present and future generations in mind while developing the society
[24]Ibid

maintain as the generator and other equipment using fuel in generating energy. Renewable energy generation process is environmentally friendly emitting little or no greenhouse gases or pollutants into the environment. Fossil fuel on the other hand emits dangerous gases that pollute the environment and are hazardous to man, animals and plants. Renewable energy helps reduce pollutants responsible for numerous health issues which emanate from pollution. Renewable energy paves way for energy security benefits: - This occurs when total dependence on imported fuel decreases benefiting domestic energy security and reduce price volatility. It also provides human security by protecting the environment by ensuring water, air, and land are not degraded or compromised. Renewable energy can help stabilize energy prices when people have alternatives to conventional oil for energy production. In that case, the price of oil will be automatically controlled unlike when there are no alternatives or competition. Renewable energy is not devoid of its own environmental challenges but has environmental and economic benefits which outweigh the disadvantages.

Clean energy is a sure path way to sustainable development. Quest for clean energy in Nigeria is in line with its endorsement of the Paris Agreement on Climate Change in September 21, 2016. Recently, precisely on the 3rd of March 2020 Federal Government Launched $200m renewable energy project to light up 500,000 households. Providing reliable energy to 20,000 micro, small and medium enterprises (MSMES) and halted 1.69 million tons of carbon emission into the environment. This is in line with Nigeria's commitment to combating climate change[25] Also, ensuring protection of the environment by preventing air pollution, at the same time encouraging clean energy such as renewable energy, there is a proposed bill for the ban on generator use and is intended to punish offenders who go against the bill.[26] Countries such as the United States and China are investing heavily on wind, hydro, solar and biofuels having an estimate of over 7.7 million estimated number of jobs associated with renewable energy companies and industries.[27]. This means renewable energy investment also creates jobs. This could lead any economy towards a successful path of sustainable development in all ramifications. There are optimistic potentials for renewable energy in Nigeria. Financing renewable energy in Nigeria has been viewed by practitioners and commentators as the single largest barrier to the expansion of improved uptake of renewable energy.[28] Notwithstanding other countries have been able to take up the challenge and produce positive result. For Nigeria to be in the forefront of industrialization in a sustainable manner, renewable energy can provide a good platform.

8. Positive Steps towards Development of Renewable Energy in Nigeria

There is need for diversification and shift in energy production. There is need for careful and systematic policy research and financial support for development of the renewable energy sector. Education and enlightenment of the populace on the advantages and possibility of renewable energy is key to its development. There is the need for understanding of renewable energy as viable alternative energy solution. Government and other stakeholders should stand out as advocates and promoters of renewable energy, incentives for efficiency, and demand reduction. Demand reduction in consumption of millions of consumers and regulatory incentives for small systems interested in renewable energy generation. The need for clear regulatory legal system and institutional framework on renewable energy project seems absent in Nigeria.[29] Modern technologies in harnessing the huge potential of renewable energy in Nigeria should be made available as non-availability could hamper development of renewable energy projects in Nigeria.

9. Renewable Energy and Sustainable Development in Nigeria

Amongst Nigeria's seventeen (17) sustainable development goals, goal seven envisages affordable and clean energy[30]. In every society energy is a major factor which enhances industrialization. It plays an essential role in economic growth, development, and poverty reduction of any nation. Even as economic growth depends on energy supply, it must be from sources which are in tandem with sustainability. The sources should also be environmentally friendly for sustainability. The lack of access to energy experienced in remote villages contributes to poverty, underdevelopment and deprivation of basic necessities and amenities which help in the well-being of citizens. One major long term ambition for Nigeria's electricity sector is the emission reduction

[25]T. Adebulu. Federal Government launches $200m renewable energy project.Avaliable at https://www.cable-ng.cdn.am.project.org>acessed 8 march 2020

[26]Ibid.

[27] O.Kehinde et al. Renewable Energy in Nigeria- A Review. *International Journal of Mechanical Engineering and Technology* 9 2018. Pg. 1089

[28]Ibid.

[29] S.0 Oyedepo 'Towards achieving Energy for Sustainable Development in Nigeria' *Renewable and Sustainable Energy Review*34 (2014). 255, 269.

[30]Available at www.sdgs.gov.ng/sustainable.un/212522030 goals-sdgs-nigeria-way 2017<accessed on 14 march 2020

target. It includes; Nationally Determined Contribution (NDC) under the Paris agreement 2016 by pledging a 20% reduction of Business As Usual (BAU) greenhouse gas emission (GHGs) by 2030.[31] This laudable development has embedded in it important plans for environmental protection.

10. Enhancing Existing Legal Framework for Renewable Energy Projects in Nigeria

An enabling policy and functional regulatory framework in the area of renewable energy, is a pre-requisite in addressing investment risks[32] and ensuring long term and reliable operations. There have been global concerns for security of energy supplies and reduction of environmental impact of fossil – type energy. In this connection sustainability has been the driving force for the exploration of alternative energy. Nigerian government must be committed to entrenching the right and conducive legal environment for enhancement of renewable energy project. The power sector in Nigeria is currently interested in renewable energy sources in an attempt to enhance electricity production. Deployment of renewable energy sources in the power sector is a strong consequence of climate change, environmental and energy security policies. It is an attempt to resolve the classic energy dilemma facing the world security, sustainability and economic prosperity[33]. Renewable mini-grids-which use technology to harness energy from solar, hydro biogas and biomass are being explored. These mini-grids are expected to play an important role in bridging the electricity access deficit in a timely manner. It is estimated that between 2016 and 2030 renewable energy sources will power around 60% of new access connections of which 40% will be through mini-grids[34]. Therefore, it is proposed that, to secure energy future for Nigeria, there is the need for a robust and viable legal and regulatory framework. Such a legal framework would be significantly instrumental in the attainment of a secure energy future for Nigeria. The Federal Government must be interested and committed to supporting the platform as well as rights of its people in the area of renewable energy. This would also make the sector attractive to foreign investors.

11. Existing Legislative Framework for Renewable Energy Project in Nigeria

Renewable Energy Master Plan (REMP) 2012[35]

This is a policy being implemented by Nigeria's Federal Ministry of Environment that aims to increase the contribution of renewable energy to account for 10% of total energy consumption by 2025. The master plan provides a regulatory framework to help achieve its objectives and targets which include maintaining a renewable portfolio standard, creating fiscal and market incentives, integration of renewable energy into Non Energy sector policies, standardization of renewable energy product[36].

National Renewable Energy and Efficiency Policy 2015 (NREEP)

This policy was endorsed on April 2015 by the Federal Executive Council (FEC) to drive renewable energy development and improve energy efficiency in Nigeria. The purpose of this policy was to set out a framework for action to address Nigeria challenge of inclusive access to modern and clean energy resources, improved energy security and climate objectives; set national targets for achievements in electricity from renewable energy and energy efficiency capacity addition by 2020 and beyond, amongst others. It is uniquely focused on hydropower, biomass, solar, wind, geothermal, wave and tidal energy power generations, projecting a national generation profile of 6,156MW and 12,801MW of hydropower, 3.4MW and 11,7MW of biomass power, 1,343MW and 6,831MW of solar power, 631MW and 3,211mw of wind energy between 2020 and 2030. Mandating government to provide guarantees and financial frameworks to facilitate the expansion of Nigeria's renewable electricity market[37]

National Energy Policy (NEP) 2003, 2006, 2013

The policy does not support Nigeria's over dependence on oil which has slowed down the development of alternative fuel. The ultimate goal of the policy is creating energy security through energy supply mix by diversifying the energy supply and energy carriers based on the principle of ' an energy economy in which modern

[31]M.Y Roche et al.Achieving Sustainable Development Goals in Nigeria's Power sector: assessment of transition pathways, climate policy.Journal climate policy 2019.https://www.tandfonline.com/doi/full/10.1080/14693062.2019.1661818

[32]O.V Ojo op cit note22

[33] P.K Oniemola 'Legal Response to support Renewable Energy in China'. *Journal of Energy,Environment and Natural Resources*. 32 (2014) International Bar Association

[34]IRENA (International Renewable Energy Agency) Policies and Regulations for Renewable Energy minigrid

[35]Available at <https:www.energy.govng. accesed 10 march 2020

[36]See Renewable Energy Master Plan (REMP) 2005 AND 2012,Avaliable at www.energy.ng.Acessed on the 14march 2020.

[37] See National Renewable Energy and Energy Efficiency Policy for Nigeria 2015, available online at www.energy.gov.ng.Accessed 19 March 2020

renewable energy increases its share of energy consumed, as well as providing affordable access to energy throughout Nigeria, thus contributing to sustainable development and energy conservation,[38] with an aim to broaden the energy options for generating electricity, with specific regard to renewable energy. The policy set out some important principles and policies as follows:

(a) Non renewable energy sources are to be used sparingly while Nigeria sets to make steady and reliable power at all times to at least 75% of the population by the year 2020 for social, industrial and economic activities
(b) Identification of nuclear, biomass, wind, solar hydro and hydrogen as viable energy sources to be used by the country in an environmentally sustainable manner.
(c) Local research, developing and exploiting energy potentials to be commercially undertaken through private, public and indigenous participation.
(d) Integrated energy planning system would be developed which involves energy related programs and activities of other sectors[39] although these policies do not appear to have legal backing or force of law and cannot impose statutory obligation on government, private or public sector. Such can still be infused into the policy for more strength and enforceability.
(e) Intensification of research, development and training in alternative sources of energy for the generation of electricity.

Policies are articulated for solar, biomass and wind energy encouragement in exploitation while keeping abreast with worldwide development in renewable energy.

National Biofuel Policy and Incentive 2007

This was initiated by the country's National Petroleum Corporation (NNPC) and approved by the Federal Government. The aim is to reduce the nation's dependence on imported gasoline, reduce environmental pollution while creating a commercially viable industry that can precipitate sustainable domestic jobs. The input of the policy to the renewable energy regulatory environment includes the establishment of a Biofuel Commission, issuance of biofuel regulation by the Minister of Petroleum Resources, establishment of a biofuel research agency, funding of research and development in biofuel development and incentives scheme for participants in the biofuel development subsector[40] The Renewable Energy Division (RED) was mandated to champion the implementation of the program. Charged with the responsibility of developing biofuel industry in Nigeria[41], RED shall provide a consistent steady supply of alternative fuel to the utmost satisfaction of customers and continuously seek to improve quality of its management system. Crops with biofuel potentials in Nigeria Include: sorghum, cassava, sugarcane and jatropha which is a non-edible plant.

Energy Commission of Nigeria Act

This Act was first promulgated in 1979, amended in 1988 and 1989 respectively. The commission is empowered with the responsibility of coordinating and general surveillance of the systematic development of the various energy sources in Nigeria[42] The commission in pursuit of its mandate in developing, harnessing and distribution of renewable energy and protecting the environment from the harmful effect of fossil fuel has developed the National Energy Master Plan and the Renewable Energy Master Plan which provides detailed policies towards the meeting of Renewable Energy target. Other Nigeria energy policies and strategies which provide an insight into the scenario of renewable energy policies include National Electrical Power Policy (NEPP) 2001, Renewable Electricity Policy Guidelines (NEPG) 2006, Renewable Electricity Action Programme (REAP)2006,[43] Electrical Power Sector Reform Act 2005(EPSRA), Captive Energy Generation Regulation (CEGR).

12. Conclusion and Recommendations

In conclusion, improved energy supply is tantamount to improved standard of living. This manifests in increase in food production, provision of efficient transportation, adequate shelter, improved health care and enhancements on other human resources. Nigeria is not only blessed with non-renewable energy sources such as natural gas,

[38] See National Energy Policy (NEP) 2003.Energy commission of Nigeria (ECN) Abuja Federal Republic of Nigeria. <available at www.energy.gov,ng.>acessed 19th march 2020.
[39] Ibid
[40]See generally Nigerian National Petroleum Corporation (NNPC) Draft Nigerian Bio-fuel Policy and Incentives, Nigerian National Petroleum Corporation, Abuja 2007
[41] Africa's first Ethanol Refinery flagged off in Ekiti.'Available athttp://www.tribune.com.ng/16092008/biznes.html> accessed 19 march 2020
[42] Avaliable at<http://www.energy.gov.ng> accessed on the 20 march 2020
[43] N.V Emordi and N.E Ebele 'Policies Promoting Renewable Energy Development and Implications for Nigeria.*British Journal of Environment and Climate Change*6(1) 20163-5

crude oil, and tar sands, and shale oil deposit but with renewable energy sources such as hydro, biomass, solar and wind. Nigeria's total dependence on oil and gas consumption for commercial energy is an aberration when there are alternative sources of energy resources waiting to be explored. In the light of this, the government should channel its energy and resources into positive ways of diversifying source of energy production, such as harnessing renewable energy resources as well as determination of the possibility of exploration of shale oil resources which the United States have since explored and have even become commercial suppliers. Monopoly of any market automatically results in sky rocketed prices, but when competition comes into play, prices are automatically forced to drop. National energy policies exist to encourage exploitation of renewable energy sources and its integration into the national energy supply mix for sustainable national development, through private sector participation. Regulatory institutions to renewable energy include standard organization of Nigeria (SON) whose responsibility is to set and enforce standardization of goods and services. Laudable efforts should be made to get the energy policy and master plan passed into energy law. Since there exists a draft national renewable energy master plan, this can help fast track renewable energy development in Nigeria. Also, diversification of energy sources can revamp the economy at the same time create more jobs as well as energy security.

In the light of the foregoing, a legal and institutional framework as well effective implementation strategy for the exploration and production of Shale oil should be put in place by the government. Incentives should be provided for interested investors in renewable energy and shale oil production. Expansion of capital financing for renewable energy and shale oil is necessary. Both are capital intensive. There should be enlightenment and sensitization of the public to improve their choice of consumption gearing interest towards renewable energy thereby eradicating existing bias against the industry. Other remedies include strengthening existing initiates, developing renewable energy plan and regulation of renewable energy, collaboration between policy makers and renewable-energy developers, on best ways to provide tangible services and also involvement in rural community development in order to spur interest in renewable energy projects, advocating for the need to achieve the Paris Agreement in Nigeria towards clean energy production, thereby spiking the necessity for alternative cleaner source such as renewable energy. There is need for more bills by the National Assembly to eradicate pollution caused by fossil fuel, and creating interest in investment in renewable clean energy sources. The judiciary should lend its voice after prosecuting offenders polluting the environment during fossil fuel exploration on the need for an alternative to fossil fuel. This would help to reduce the amount of litigation in the area of pollution of the environment. Sustainable development should be a primary focus in Nigeria and this can be greatly achieved through investment in renewable energy as an alternative source. Sustainable development should include achieving a green economy which focuses on reduced carbon emission and pollution, enhanced energy and resources efficiency, which is pursuit of economic growth and development; this can be achieved by employing renewable resources.