

# AN OVERVIEW OF ENERGY MANAGEMENT AND SUSTAINABLE DEVELOPMENT IN NIGERIA

By

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## ***Abstract***

*The importance of effective energy use and management to ensure the sustainability of the economy is the focus of this paper. Energy is crucial to the development of any nation. Therefore, the direct link between energy management and sustainable development is outlined through the discussion of the status and sources of energy use in Nigeria, and how the total reliance and emphasis on a particular source of energy and the neglect of another has had adverse impacted on the development of the nation and the wellbeing of its people. This paper examines Nigeria's notable energy policies and the impact such policies have had on energy management and sustainable development in the country. Inefficient and improper management of energy directly influences the socio-economic activities by restricting it. It may also limit economic growth and adversely affect the quality of life. The need for proper legislation and enforcement procedure through the machinery of the law is emphasized in the paper after looking at other jurisdictions of the world. Since Nigeria, is endowed with abundant energy resources, both renewable and non-renewable, management becomes a crucial factor. Therefore, we have also examined the efficiency and equitable use of energy and how the use of legislation and judicial intervention can help to achieve the overall goal of sustainable development. The paper finally proffers recommendations and conclusion.*

**KEYWORDS:** Renewable, Sustainable, Energy, Development, Green-House.

## **Introduction**

The developmental needs of modern societies are directly linked to energy use. Our current approach to development is usually for us to focus on a particular developmental need without fully considering the wider or future impacts. Energy management is the sustainability, efficiency and equitable use of energy. Energy consumption per capita is one of the indicators or benchmarks for measuring the standard of living of a nation. Sustainable development on the other hand, is a process for meeting human development needs without compromising the ability of natural systems to continue to provide the natural resources and ecosystem balance upon which the economy and society depends that is, a development that is sustained over generations. 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

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long-term storage of waste products of the nuclear power industry is an issue to be resolved and the changes in global climate resulting from our dependence on fossil fuel-based energy sources can no longer be ignored. The longer we pursue unsustainable development, the more frequent and severe its consequences are likely to become, which is why we need to take action now by exploring how we can effectively manage our energy use without at the same time destroying the sustainability of our development.

Energy management is the planning and operation of energy production and energy consumption units with the objectives of resource conservation, climate protection and cost savings, while the users have permanent access to the energy they need. It is closely connected to environmental management. It is the proactive, organized and systematic coordination of procurement, conversion, distribution and use of energy to meet our requirements, taking into account environmental and economic objectives.<sup>1</sup>

We can also describe energy management as energy security, which is the provision of adequate, affordable, efficient and reliable energy services with minimal adverse impact on the environment. Energy services are the desired and useful product and processes that we gain from the use of energy. These services include, the provision of basic needs such as cooked food, a comfortable living temperature, lighting, the use of electrical appliances, piped borne water or sewerage, essential health care (refrigerated vaccines, emergency, and intensive care), educational aids, communication (radio, television, electronic mail, the World Wide Web), and transport. Energy also fuels productive activities including agriculture, commerce, manufacturing, industry, and mining. Conversely, a lack of access to energy contributes to poverty and deprivation and can contribute to the economic decline of any given society. Because energy is closely connected with productivity, income growth, education, and health, the socioeconomic development of any nation depends majorly on energy use.

Sustainable use of energy is concerned with how much and at what rate is energy consumed the effect of consumption, available alternative renewable forms of energy and effect of the existing use and management of energy on the environment. Nigeria is plagued with challenges in the energy sector ranging from political, social and economic which impacts negatively on sustainable development. Statutory intervention on the management and enforcement of environmental planning and protection in form of legislations such as the Oil Pipelines Act of 1956<sup>2</sup>, Petroleum Act of 1969<sup>3</sup>, Petroleum Regulations of 1967<sup>4</sup> Federal Environmental Protection Agency Act 1988<sup>5</sup>, Associated Gas re-Injection Act (1976) and several other legislations enacted to control and oversee the management of energy focuses more on non-renewable energy sources. This paper aims to examine the extent to which statutory intervention can be employed towards ensuring sustainable development through the accommodation of renewable source of energy. The criminal activities of pipeline vandals not only attack the economic growth of the nation, it also destroys the environment at an unprecedented rate-this calls for ways to save the future generation and ours.

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<sup>1</sup> <https://en.wikipedia.org/wiki/energy-management> accessed on 13/2/2017

<sup>2</sup> Cap 145, LFN 1958 now O7 LFN 2004

<sup>3</sup> No 51 of 1969; Cap P10 LFN 2004

<sup>4</sup> LN 71 of 1967, a subsidiary regulation to the Petroleum Act

<sup>5</sup> Cap F10, LFN 2004, Repealed by the National Environmental Standard and Regulation Enforcement Agency(Establishment )Act 2007

## Status and Sources of Energy Use in Nigeria.

Energy is the most fundamental part of our universe, it lights our cities, power our vehicles, transport planes and rockets, warms our homes, cook our food, play our music and powers machinery in factories. Energy drives development and sustains economic systems. Civilization gets the energy it needs from energy resources such as fossil fuels, nuclear fuel and renewable energy. The available energy resources in Nigeria range from hydrocarbons such as oil, gas, coal and uranium, to renewable energy such as solar, wind, hydroelectric, biomass and geothermal as well as the potential to develop nuclear energy as an alternative source of electricity<sup>6</sup>.

All forms of energy are stored in different ways, in the energy sources that we use every day. We can divide these sources of energy into two major groups:

**Renewable energy** is an energy source that we can use and replenish. We cannot exhaust or run out of renewable energy because we can renew as we use. Examples of sources of renewable energy are sun (solar energy), wind (wind energy), earth (geothermal energy), biological waste (biomass energy), and water (hydropower). Solar energy, from the sun, is turned into heat and electricity so also the other forms of renewable energy.

**Non-renewable energy:** this is the conventional source of energy, which we cannot replace as we use - it cannot be renewed. Non-renewable sources include fossil fuels such as oil, natural gas and coal. They are called fossil fuels because they were formed over millions and millions of years by the action of heat from the Earth's core and pressure from rock and soil on the remains (or "fossils") of dead plants and animals. Another non-renewable energy source is the element uranium, whose atoms we split (through a process called nuclear fission) to create heat and ultimately electricity.<sup>7</sup> The major source of energy use in Nigeria is non-renewable. Oil is found in form of large deposits of crude in the Niger Delta while natural gas is found alongside the oil.

Nigeria's energy use is dominated by oil to the neglect of the other resources. Large deposits of oil in crude form are found in abundance in Nigeria as she is rated as having a large deposit of natural gas with some oil in it. This is because her abundant reserves of natural gas are estimated to be more than 100 trillion standard cubic feet, and this is far in excess of the crude oil reserves of the country<sup>8</sup> -this is enough to see Nigeria through two hundred years of domestic consumption and export. Nigeria is currently not focusing much on the gas reserves even though she possesses this in abundance. Nigeria is likely to become a major gas rather than oil producer if all the potentials are fully developed. A very large quantity of the natural gas extracted in oil wells in the Delta is immediately burned or flared into the air at a rate of approximately 70 million m<sup>3</sup> per day. This is equivalent to 40% of African natural gas consumption and forms the single largest source of greenhouse gas emissions on the planet. Nigeria also has tar sands, uranium reserves and nearly 1,000 million tons of coal.<sup>9</sup>

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<sup>6</sup> Ladan, Muhammed Tawfiq (2013) "Overview of Recent Development in Energy Resource Law in Nigeria" retrieved from <https://ssrn.com/abstract=2404357> on 13/2/2017

<sup>7</sup> [www.kids.esdb.bg/whatisenergy.html](http://www.kids.esdb.bg/whatisenergy.html) accessed on 13/2/17

<sup>8</sup> Ladan, Muhammed Tawfiq (2013) "Overview of Recent Development in Energy Resource Law in Nigeria" retrieved from <https://ssrn.com/abstract=2404357> on 23/3/17

<sup>9</sup> *ibid*

Sustainable energy use is where energy use focuses more on the use of renewable energy so as to sustain the long run supply as well as reduce damaging impacts on the environment. Renewable energy is clean, and we can use it over a long period. Unlike fossil fuels that most countries are using, renewable energy only produces little or even no pollution. The most common types of renewable energy are hydroelectric, solar and wind energy. Solar energy is commonly used on public parking meters, streetlights and the roof of buildings. Wind power has expanded quickly; its share of worldwide electricity usage at the end of 2014 was 3.1%.<sup>10</sup> The management of energy use in Nigeria poses great danger to sustainable development as can be seen in the placement and use of most of her fossil fuel infrastructures. The pollution caused by toxic emissions are major contributors to health problems in the oil producing communities in Nigeria. The sustainable development of the oil and gas sector is, therefore, of utmost importance, especially since virtually all of the activities in both the upstream and downstream sub-sectors are not only pollution-prone, but also readily provoke social discord. As renewable energy becomes more common, renewable energy plant will replace fossil fuel infrastructures, providing better social equity to these communities. Sustainable development in the field of energy directly contributes to economic sustainability and national security of these communities and Nigeria as a whole. Attaining sustainable development must be the focus of policy makers in the use and management of energy in Nigeria. Energy management is the key to saving energy and it becomes necessary so that we can preserve non-renewable energy for as long as humanity lasts. We need to explore alternative use of energy so that we can reduce damage to the earth and to reduce our dependence on fossil fuels, which are becoming increasingly limited in supply.

### **Sustainable Development and Energy use in Nigeria**

Nigeria as a nation will benefit immensely from sustainable use of energy and she will achieve this if she focuses more on the utilization of renewable energy. Renewable energy sources have the potential of producing clean energy, which impact more positively on the environment. Nigeria's usage of renewable energy such as hydroelectric energy, geothermal and solar energy is quite limited, although there is a realization that the renewable energy sector must grow in order for the country to develop sustainably. The Nigerian government is making efforts to increase the nation's use of renewable energy to reduce dependence on fossil fuel. Despite the seasonal nature of Nigerian rainfall, which limits hydropower from increasing in importance, hydropower facilities have been increased over time. The consumption of solid biomass in form of wood is a bit high and prevalent in the rural areas but it is important to ensure sustainable use of this resource by replacing trees that are felled for fuel.

Energy management requires the implementation of technologies that can improve the energy situation of a given country, energy-efficient technologies, and the proper use of conventional energy resources. To achieve this, effective energy policy options must be put in place. In Nigeria, the development of sustainable clean modern energy is an immense challenge, as is the proper use of the country's conventional energy resources. This is due to the lack of effective support policies and poor participation by the government in clean energy development. The energy situation in

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<sup>10</sup> Nnaji C. et al (2010) CIA World Factbook eds Nnaji C.E, Uzoma C.C, retrieved from <http://www.cia.gov/library/publications/the-world-factbook/geos/ni.html>

Nigeria could be improved by the provision of adequate energy policy options designed to augment existing energy policies.

The Energy Commission of Nigeria (ECN), which was established by Act no. 62 of 1979 as amended by Act no.32 of 1988 and Act no. 19 of 1989, is charged with the responsibility for the strategic planning and coordination of national policies in the field of energy in all its ramifications. Although it is part of the mandate of the Energy Commission to provide recommendations for the exploitation of new sources of energy as when considered necessary. It can be seen that there is no special emphasis on exploring and funding in areas of renewable energy.<sup>11</sup>

The use of biomass will reduce global warming considerably. Biomass is the energy extracted from plant materials, its use therefore will not result into the emission of greenhouse gases as in the case of a fossil fuel-powered plant. This is because plants use and store carbon dioxide (CO<sub>2</sub>) when they grow. CO<sub>2</sub> stored in the plant is released when the plant material is burned or decays. By replanting the crops, the new plants can use the CO<sub>2</sub> produced by the burned plants. So, using biomass and replanting helps close the carbon dioxide cycle. However, if the crops are not replanted, then biomass can emit carbon dioxide that will contribute toward global warming. Therefore, the use of biomass can be environmentally friendly because the biomass is reduced, recycled and then reused. It is also a renewable resource because plants after use are simply replanted.<sup>12</sup>

Biomass is made not only from felled trees, it can also be made from garbage such as dead tree branches, garden clippings, left-over crops, wood chips or dust, and bark and sawdust from lumber mills. It can even include used tires, livestock manure, and other household waste. In Nigeria, the rate at which energy is consumed shows that the need for energy is exceeding its supply. In view of this observation, energy management becomes very important for economic stability and development<sup>13</sup>. The ever-increasing demand and meagre supply of energy in Nigeria has been a great challenge to her development. This situation is becoming critical, with increasing population not balanced by an adequate energy development program. The incessant power generation failure has grossly affected the economy, seriously slowing down development in rural and sub-rural settlements. Apart from the individual Nigerian and the tendency to disregard management in their use of energy, the Nigeria government has a long way to go in this direction. In Nigeria, a lot of energy is wasted because households, public and private offices, as well as industries use more energy than is actually necessary to fulfil their needs. One of the reasons is that they use outdated and inefficient equipment and production processes. Unwholesome practices also lead to energy wastage.

We can interpret the concept of sustainable development in many different ways, but at its core is an approach to development that looks to balance different, and often competing, needs against an awareness of the environmental, social and economic limitations we face as a society. Nigeria is

<sup>11</sup> [Lawnigeria.com/lawsofthefederation/Energy-Commission-of-Nigeria-Act.html](http://Lawnigeria.com/lawsofthefederation/Energy-Commission-of-Nigeria-Act.html) retrieved on 13<sup>th</sup> March 2016

<sup>12</sup> [www.energyquest.ca.gov/story/chapter01.html](http://www.energyquest.ca.gov/story/chapter01.html) retrieved on 10th October 2016

<sup>13</sup> Akinbami JFK, Ilori MO, Oyebisi TO, Akinwumi IO, Adeoti O: **Biogas energy use in Nigeria: Current status, future prospects and policy implications**. *Renewable and Sustainable Energy Review* 2001, 5: 97–112. 10.1016/S1364-0321(00)00005-8 cited in Oyedepo S.O(2012) “ *Energy and Sustainable Development in Nigeria: The Way forward*” pub in *Energy, Sustainability and Society* 2012, 2:15 retrieved from <https://energysustaindc.springeropen.com/articles..on> 12th august 2016

one of the highest emitters of greenhouse gases in Africa because of the practice of flaring gas by the oil companies operating in Nigeria. Carbon dioxide emissions in this area are among the highest in the world. Some 45.8 billion kW of heat are discharged into the atmosphere of the Niger Delta from flaring 1.8 billion ft<sup>3</sup> of gas every day. Gas flaring has raised temperatures and rendered large areas uninhabitable. Between 1970 and 1986, about 125.5 million m<sup>3</sup> of gas was produced in the Niger Delta region, about 102.3 (81.7 %) million m<sup>3</sup> were flared, while only 2.6 million m<sup>3</sup> were used as fuel by oil-producing companies and about 14.6 million m<sup>3</sup> were sold to other consumers<sup>14</sup>. This is one of the major causes of pollution from petroleum production for which attempts have been made through legislation to correct. With respect to oil pollution, the attempt at protecting the Nigerian environment through the use of Statutes dates back to colonial time when the Oil Pipelines Act of 1956 was passed<sup>15</sup>. The Associated Gas Re-Injection Act (AGRA) 1979<sup>16</sup> contains regulation that are aimed at addressing the problem of air pollution as a result of gas flaring in Nigeria. By s 2(1) of the Act, every company producing oil and gas in Nigeria is mandatorily required to make known to the minister all plans for the re-injection of associated gas from oil production. The deadline was put at October 1980 and later shifted to a total ban on flaring without the written permission of the minister to 1<sup>st</sup> January 1984<sup>17</sup>. The legislative effort by the Nigerian government to remove the danger of gas flaring in Nigeria was further manifested in the Petroleum Industry Bill 2012. The Bill seeks to harmonize all existing oil and gas laws in Nigeria into a single piece of legislation which will cater for all challenges in that sector. Even though the Bill stated in its part one<sup>18</sup> that one of its objectives is to ‘protect health, safety and the environment in the course of petroleum operations for the benefit of the Nigerian people; it does not at all offer any protection on the health of Nigerians in vulnerable locations where gas flaring still persist. The proposed Bill in its failure to provide a lasting solution to the problem of gas flaring in Nigeria differs not from the Associated Gas Re-Injection Act of 1979 in that it fails to totally prohibit gas flaring.<sup>19</sup>

Energy management would include an improvement in practices that leads to the reduction in the energy necessary to provide services. To effectively manage our use of energy, we use less energy to provide the same service without affecting output, consumption, or comfort levels and at the same time, reducing or reversing the negative impact of energy production and consumption activities on the environment. The use of renewable energy sources will reduce the over dependence on the burning of fossil fuel. Moreover, instead of flaring gas in Nigeria, the gases can be converted to methanol and used as a fuel for both domestic and industrial use. With good energy efficiency practices and products, the burning of fossil fuel for energy will be greatly minimized.<sup>20</sup>

Human activity is largely responsible for the emission of greenhouse gases into the atmosphere: CO<sub>2</sub> 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 agricultural activities, fossil fuel use, landfills. 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

<sup>14</sup>Retrieved from [https://en.wikipedia.org/w/index.php?title=Energy\\_management&oldid=727889320](https://en.wikipedia.org/w/index.php?title=Energy_management&oldid=727889320) on 13/2 /16

<sup>15</sup> Cap.145 LFN 1958 now Cap 07 LFN 2004

<sup>16</sup> cap

<sup>17</sup> S 3(1)

<sup>18</sup> Part 1, Section 1

<sup>19</sup> Section 201 of the Bill stipulates that the ‘lessee shall pay such gas flaring penalties as the Minister may determine from time to time. This is a mere replication of the earlier acts in this regard.

<sup>20</sup> [www.azuko.org/sustainable](http://www.azuko.org/sustainable) accessed on 4/10/2016

increased; since 1750, at the time of the industrial revolution, CO<sub>2</sub> emission has increased by 31%, methane by 15%, and nitrous oxide by 17%. Moreover, the emissions of these gases continue to rise steadily<sup>21</sup>. In order to ensure that energy use does not impact negatively on sustainable development for the nation, investment in clean energy is a viable option. To invest in clean energy is to invest in an energy supply and utilization system that provides the required energy with minimal negative environmental and social challenges.<sup>22</sup> Investment into clean energy systems can also be viewed as an investment into energy sources and technologies that are significantly less environmentally damaging than it is presently<sup>23</sup>.

### **Notable Energy policies and Legal Framework in Nigeria.**

The Nigerian government has over time put policies in place to ensure effective use of energy- These policies govern energy use and management in Nigeria. Energy policy is the manner in which the government has decided to address issues of energy development, production, distribution and consumption- the total package for energy management. Some of these policies are:

National Electric Power Policy (NEPP) which was developed as a result of the recommendations of the Electrical power implementation Committee set up to take charge of reforms and transformation of the power sector in 1999. NEPP came into being in March 2001<sup>24</sup>. This reform was done to ensure liberalization in the energy sector to ensure competition.

The National Energy Policy (NEP)<sup>25</sup> sets out government policy on the production, supply and consumption of energy reflecting the perspective of its overall needs and options.

The National Energy Policy (NEPP) was established and developed by the Energy Commission of Nigeria. The federal government approved it in the year 2003 and further extends it in 2006 and 2013;<sup>26</sup> before it, there was no comprehensive energy policy. The main goal of the policy is to provide energy security in such a way that renewable energy, through diversification of the energy

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<sup>21</sup> Oyedepo S. O (2012) "Energy and Sustainable Development in Nigeria- the way forward" retrieved from <https://energysustainsoc.springeropen.com/articles/.on> 13/3/2016

<sup>22</sup> IPCC(Inter-governmental Panel on Climate Change)report.[www.worldbank.org/depweb/English/sd.html](http://www.worldbank.org/depweb/English/sd.html) accessed on 23/4/2016

<sup>23</sup><http://www.premiumtimesng.com/news/headlines/199405-nigerias-electricity-output-sharp-fall-2800mw-regulator.htm>. retrieved on 13/3/2017

<sup>24</sup> Maduekwe, N. C. Unbundling and Privatization of the Nigerian Electricity Sector: Reality or Myth? University of Dundee, Scotland, United Kingdom. (2011). Retrieved August 6, 2015, from [www.dundee.ac.uk/cepmlp/gateway/files.php](http://www.dundee.ac.uk/cepmlp/gateway/files.php)? As cited in

<sup>25</sup> National Energy Policy (NEP)2003, Energy Commission of Nigeria, Abuja; Federal Republic of Nigeria. As cited in Nnaemeka Vincent Emodi, Nebedum Ekene Ebele. ' Policies Enhancing Renewable Energy Development & Implications for Nigeria' sustainable Energy Vol 4 no 1 2016 pp 7-16 retrieved from [http:// pub sciepub.com/rse/4/12](http://pub.sciepub.com/rse/4/12) accessed on 11<sup>th</sup> May 2017

<sup>26</sup> National Energy Policy (NEP)2006, Energy Commission of Nigeria, Abuja; Federal Republic of Nigeria. As cited in Nnaemeka Vincent Emodi, Nebedum Ekene Ebele. ' Policies Enhancing Renewable Energy Development & Implications for Nigeria' sustainable Energy Vol 4 no 1 2016 pp 7-16 retrieved from [http:// pub sciepub.com/rse/4/12](http://pub.sciepub.com/rse/4/12) accessed on 11<sup>th</sup> May 2017

supply and energy carriers increases its share of energy consumed and provides affordable access to energy throughout Nigeria, thus contributing to sustainable development.

National Economic Empowerment and Development Strategy (NEEDS): The National Economic Empowerment and Development Strategy (NEEDS) is a development and poverty alleviation strategy developed by the National Planning Commission (NPA) in 2004<sup>27</sup>. This was done by harnessing the natural resources of the country to produce goods necessary for the economic needs of the community. For the development of infrastructure, NEEDS promotes the privatization of government infrastructural facilities but encourages the government to fund projects that have very low attractiveness and high investment cost to investors such as those in rural areas. NEEDS further encourages the increased utilization of renewable energy by suggesting the creation of renewable energy agency and technologies which will be funded under the National Power Sector Reform Act. This was the milestone towards the adoption of energy from renewable sources in the power sector and its utilization for rural electrification<sup>28</sup>

National Power Sector Reform Act (EPSRA): was established in 2005 to ensure the liberalization of the Nigerian power sector. The Act came into being because of the provision made in NEPP 2001 for new legal and regulatory framework for the power sector. The Act gave way to unbundling and privatization of the power sector, which intends to introduce competition in the electricity market, enhance rural electrification, while protecting consumer rights and developing performance standards in the power sector<sup>29</sup>

Renewable Electricity Policy Guidelines (REPG) is the policy employed by the Federal Ministry of Power and Steel to mandate the Nigerian government to expand electricity generation from renewable energy sources to at least 5% of the total electricity generated in the country (REPG, 2006). This policy document presents the Nigerian government's plans, policies, strategies and objectives for the promotion of renewable energy in the power sector<sup>30</sup>.

Renewable Electricity Action Programme (REAP), 2006 is another policy Developed in relation to the REPG by the Federal Ministry of Power and Steel in 2006, the Renewable Electricity Action Programme (REAP) set out a roadmap for the implementation of the REPG. The document presents an overview of the Nigerian electricity sector and relates it to renewable energy development. The documents also review government targets and provides strategies for

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<sup>27</sup> National Planning Commission, National Economic Empowerment and Development Strategy(NEEDS)2004. NEEDS(Vol 2) International Monetary Fund. As cited in As cited in Nnaemeka Vincent Emodi, Nebedum Ekene Ebele. 'Policies Enhancing Renewable Energy Development & Implications for Nigeria' sustainable Energy Vol 4 no 1 2016 pp 7-16 retrieved from [http:// pub sciepub.com/rse/4/12](http://pub.sciepub.com/rse/4/12) accessed on 11<sup>th</sup> May 2017

<sup>28</sup> Marcellus I. O 'Development Planning in Nigeria: Reflections on the National Economic Empowerment and Development Strategy'(NEEDS)2003-2007 Journal of Social Sciences 20(3)197-210. 2009 as cited in Nnaemeka Vincent Emodi, Nebedum Ekene Ebele. 'Policies Enhancing Renewable Energy Development & Implications for Nigeria' sustainable Energy Vol 4 no 1 2016 pp 7-16 retrieved from [http:// pub sciepub.com/rse/4/12](http://pub.sciepub.com/rse/4/12) accessed on 11<sup>th</sup> May 2017

<sup>29</sup> The Federal Government of Nigeria (FGN)(2005) Electric Power Sector Reform Act(EPSRA). [www.nercng.org/index.php/nerc-documents/func-startdown/35/](http://www.nercng.org/index.php/nerc-documents/func-startdown/35/) as cited in ibid

<sup>30</sup> Iwayemi A. Diji, C, Awotide, B Adenikinju A and Obutte P 'Towards Sustainable Universal Electricity Access in Nigeria' CPEEL (2014) [www.cpeel.ui.edu/sites/default/files/monograph-2.pdf](http://www.cpeel.ui.edu/sites/default/files/monograph-2.pdf) as cited Nnaemeka Vincent Emodi, Nebedum Ekene Ebele. 'Policies Enhancing Renewable Energy Development & Implications for Nigeria' sustainable Energy Vol 4 no 1 2016 pp 7-16 retrieved from [http:// pub sciepub.com/rse/4/12](http://pub.sciepub.com/rse/4/12) accessed on 11<sup>th</sup> May 2017

renewable energy development such as; levelling the playing field for renewable electricity producers, multi-sector partnerships, demonstration projects, supply chain initiatives, etc. The study also made provision for financing renewable programs and explored the roles of government ministries and agencies, then concludes with a risk assessment, monitoring and evaluation<sup>31</sup>

Nigerian Biofuel Policy and Incentives (NBPI), 2007 is another policy developed to help develop the biofuel industry in order to gradually reduce the dependence on imported gasoline, reduce Green House Gasses (GHGs) emissions while promoting economic development. Concrete measures include the introduction of a biofuel blend (10% ethanol) and various measures aimed at stimulating market demand for biofuels and promoting their production (e.g. tax exemptions). The policy includes the establishment of a Biofuel Energy Commission and Biofuel Research Agency and a target that by 2020 100% of biofuels consumed in the country will come from domestic production.<sup>32</sup> The utilization of agricultural product will improve agricultural activities, and this enhances sustainable domestic jobs.

This was in line with the government's directive on an Automotive Biomass Programme for Nigeria in August 2005. The NNPC was mandated to create an environment for the take-off of the ethanol industry<sup>33</sup>

Renewable Energy Master Plan (REMP) 2005 is a policy developed by the Energy Commission of Nigeria and being implemented by Nigeria's Federal Ministry of Environment. It aims to increase the contribution of Renewable Energy to account for 10% of total energy consumption of Nigeria by 2025. The Renewable Energy Masterplan for Nigeria was produced in 2006 with Support from the United Nations' Development Programme (UNDP). It articulates Nigeria's vision and sets out a road map for increasing the role of renewable energy in achieving sustainable development. The policy primarily addresses Nigeria's need for increased electricity supply, improved grid reliability and security.<sup>34</sup> This policy, which was later reviewed in 2012 expresses Nigeria's vision and sets out a road map for increasing the role of renewable energy in achieving sustainable development.<sup>35</sup>

The REMP stress the need for the integration of renewable in buildings, electricity grids and for off-grid electrical systems. Further, the importance of solar power in the country's energy mix was also highlighted in the policy document. According to the REMP, Nigeria intends to increase the supply of renewable electricity from 13% of total electricity generation in 2015 to 23% in 2025 and 36% by 2030. Renewable electricity would then account for 10% of Nigeria's total energy

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<sup>31</sup> Renewable Electricity Action Program (REAP). Federal Ministry of Power and Steel (2006). Federal Republic of Nigeria. from [www.icednigeria.org/backup/workspace/uploads/dec.-2006-2.pdf](http://www.icednigeria.org/backup/workspace/uploads/dec.-2006-2.pdf).

<sup>32</sup> 'Nigeria biofuel and incentives' retrieved from [www.lse.ac.uk/grantham\\_institute/lawnigeria/biofuel-nd-incentives](http://www.lse.ac.uk/grantham_institute/lawnigeria/biofuel-nd-incentives) accessed on 23/may/2017.

<sup>33</sup> Nnaemeka Vincent Emodi, Nebedum Ekene Ebele.' Policies Enhancing Renewable Energy Development & Implications for Nigeria' sustainable Energy Vol 4 no 1 2016 pp 7-16 retrieved from <http://pub.sciepub.com/rse/4/12> accessed on 11<sup>th</sup> May 2017

<sup>34</sup> Nigerian Renewable Energy Masterplan' [https://en.wikipedia.org/wiki/nigeria\\_renewable\\_energy\\_masterplan\\_2005](https://en.wikipedia.org/wiki/nigeria_renewable_energy_masterplan_2005), 2012

<sup>35</sup> *ibid*

consumption by 2025. However, the REMP have not been approved by the National Assembly to be passed into law.<sup>36</sup>

National Renewable Energy and Energy Efficiency Policy (NREEEP), 2014 was Developed by the Federal Ministry of Power, and was approved in April 2015 by the Federal Executive Council for the electricity sector nationwide. The policy commits Nigeria to achieving 20% of its national electricity supplies from renewable energies by 2030. However, as there is no certainty about the total available power on the national grid in any given year, these percentages have limited meaning and sometimes even conflict with each other. Current policies have different goals for renewables: while Vision 2020 aimed for 10,000 MW from wind and another 10,000 MW from solar in 2013, the Integrated Infrastructure Masterplan targets 30% renewables for 2023. The most current strategy document by government is the Intended Nationally Determined Contributions (Nigeria's low carbon development strategy): the INDC suggests that solar PV alone would add 13,000 MW to the power pool by 2030. The NREEEP falls short of this by about half, as it commits Nigeria to generating 6,830 MW of solar power by 2030.<sup>37</sup>

In 2008, a 15-year roadmap towards cost reflective tariffs called the Multi-Year Tariff Order (MYTO 1) was developed by the Nigerian Electricity Regulatory Commission (NERC). The first two phases, 2008-2010 and 2012-2017 were designed to keep consumer prices relatively low, though still affecting the price increases in a gradual manner. The final regime is intended to provide the necessary incentives for power producers and investors to operate and maintain electricity infrastructure. By the Multi-Year Tariff Order 2 (MYTO 2), the Nigerian Electricity Regulatory Commission (NERC) establishes the regulated prices to be paid to licensed electricity generation companies in providing electricity to distribution and retailing companies for the period 1st June, 2012 to 31<sup>st</sup> May, 2017, pursuant to the authority given under the Electric Power Sector Reform Act 2005 (the Act).<sup>38</sup>

These retail tariff schedules will be reviewed bi-annually, and changes may be made thereto if any or all of the generation wholesale contract price, the Nigerian inflation rate, US\$ exchange rate, daily generation capacity and accompanying capex, and opex requirements have varied materially from that used in the calculation of the tariff. A material variation for this purpose is defined as a price variation of plus or minus five per cent (+/- 5%) in any of these indices. A review of all inputs to the tariff calculation will commence in 2016 as the basis for a new Multi-Year Tariff Order (MYTO) to commence for 5 years from 1st June 2017.<sup>39</sup>

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<sup>36</sup> Nigeriaenergyfuture.org/renewable/10-renewables/19-nigeria-s-energy-policy-of-2015-nreep accessed on 23<sup>rd</sup> May 2017

<sup>37</sup> Nigeriaenergyfuture.org/renewable/10-renewables/19-nigeria-s-energy-policy-of-2015-nreep accessed on 23<sup>rd</sup> May 2017

<sup>38</sup> <https://www.iea.org/policiesandmeasures/pams/nigeria/name-13065-en.php> accessed on 23<sup>rd</sup> May 2017, www.nercng.org

<sup>39</sup> Emodi, N. V., & Yusuf, S. D. Improving electricity access in Nigeria: obstacles and the way forward. *Inter National Journal of Energy Economics and Policy*, 5(1), 335-351. 2015. As cited in Nnaemeka Vincent Emodi, Nebedum Ekene Ebele. 'Policies Enhancing Renewable Energy Development & Implications for Nigeria' *sustainable Energy Vol 4 no 1 2016 pp 7-16* retrieved from [http:// pub.sciepub.com/rse/4/12](http://pub.sciepub.com/rse/4/12) accessed on 23<sup>rd</sup> May 2017

Draft Rural Electrification Strategy and Implementation Plan (RESIP), was initially prepared by the Power Sector Reform team in 2006. However, a committee involved in the power sector reviewed and redrafted the RESIP in 2014. It was expected to establish a clear institutional step-up for the sector and set a roadmap, which will result in the development of an enabling framework for rural electrification in Nigeria. The primary objective of the RESIP is to expand access to electricity as rapidly as can be afforded in a cost-effective manner. This includes the use of on-grid and off-grid means of electricity supply. The draft is ready and awaiting approval from the government<sup>40</sup>

Oil in Navigable Waters Act (ONWA), 1968- This act is focused on implementing the terms of international convention for the prevention of oil pollution in the sea.

Associated Gas re-Injection Act (1976) (as amended) - this Act focuses on gas flaring reduction and control. It was the first anti gas flaring legislation in Nigeria for the main purpose of phasing out gas flaring. It was a statutory intervention to address the environmental impacts of gas flaring. In its recital, it is stated to be an Act to compel every company producing oil and gas in Nigeria to submit preliminary programme for gas re-injections and detail plans for implementation of gas re-injection<sup>41</sup> 'The Act placed a duty on oil companies to submit detailed programmes and plans for implementation of gas re-injection not later than 1 October, 1980<sup>42</sup> and a total prohibition without the written permission of the Minister. <sup>43</sup>.

Petroleum Industry Bill: This proposed Bill aims primarily at relieving Nigeria and the vulnerable people of the oil producing areas of the hazards of gas flaring. It however fell short of providing total relief as the Nigerian government chose to hold on to economic development over the lives and well-being of the citizen by refraining from a total ban on gas flaring. The great dependence on oil which makes a nation to sacrifice its people in this manner will be taken care of if only Nigeria will look more towards alternative source of energy and wealth.

The efforts to stop gas flaring however continues as the government moves towards compensation for oil companies who employs useful technology to commercialize gas produced rather than flare it for the benefit of the citizens and the environment as revealed in the gas master plan championed

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<sup>40</sup> *ibid*

<sup>41</sup> Retrieved from [www.nnpcgroup.com/public/NNPC-IN-THE-NEWS/Tabid/92/articles/Type/article-V](http://www.nnpcgroup.com/public/NNPC-IN-THE-NEWS/Tabid/92/articles/Type/article-V) on 21/3/18

<sup>42</sup> Section 1 of the Act states thus; 'Notwithstanding the provisions of Regulation 42 of the Petroleum (Drilling and Production) Regulations made under the Petroleum Act, 1968 every company producing oil and gas in Nigeria, shall not later than 1 April, 1980 submit to the Minister a preliminary programme for (a) schemes for the viable utilisation of all associated gas produced from a field or groups of fields;(b) project or projects to re-inject all gas produced in association with oil but not utilised in an industrial project submit detailed programmes and plans for implementation of gas re-injection not later than 1 October, 1980.

<sup>43</sup> Section 3 of the Act which states as follows:1.Subject to subsection (2) of this section, no company engaged in the production of oil or gas shall after 1st January, 1984 flare gas produced in association with oil without the permission of in writing of the minister. 2.Where the minister is satisfied after 1<sup>st</sup> January, 1984 that utilization or re-injection of the produced gas is not appropriate or feasible in a particular field or fields, he may issue a certificate in that respect in the production of oil or gas specifying such terms and condition, as he may at his discretion choose to impose, for the continued flaring of gas in the particular field or fields.

by the Nigerian National Petroleum Corporation (NNPC) and other stakeholders in the industry to completely stop gas flaring by year 2020<sup>44</sup>

Nigeria can learn from other jurisdictions such as India, Norway, Bangladesh, USA and such other jurisdictions where sustainable development was taken with all seriousness<sup>45</sup>

### **Recommendations.**

The major challenge faced in Nigeria as a result of mismanagement of energy and over dependence on fossil fuel is environmental pollution. The use of private law in the protection of the environment ensures that constituent of the environment such as plants, animals, rivers and lakes cannot be protected unless owned by an individual or organization that has a legal recognition otherwise it is only the state that can protect these constituents. As was decided in the case of *Amos & Anor v Shell B.P Petroleum Development co of Nigeria & Anor*<sup>46</sup> a community cannot hope to get protection from the courts unless they are able to prove personal individual damage. It is here recommended that the issue of locus standi should be adequately relaxed such that other private actors in this area can have access to justice. There is a need for appropriate legal reforms which will place individual citizens, nongovernmental organizations and other pressure groups in a better position to have an influence in all matters concerning sustainable development, management and use of energy. They must be able to have access to courts where necessary. It is noteworthy that in other jurisdictions, courts as much as possible tried to approach the question of access to justice and restoration of the environment in different ways. In the light of the decision of the Supreme Court in *Owodunni v. The Registered Trustees of the Celestial Church*<sup>47</sup>, it is doubtful that the locus standi issue has in any way enhanced the position of private environmental litigant such as NGO's to initiate private proceedings to secure the enforcement of public environmental law.

The over dependence of the economy on fossil fuel has over time affects the way and manner by which the courts in Nigeria decides issues of environmental pollution. In the case of *Allar Iron v Shell B.P*<sup>48</sup>, the High court refused a prayer for injunction to restrain the defendant from further

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<sup>44</sup> A reduction in gas flaring by 26 percentage points in the last ten years from 36 per cent to 10 per cent, pushing Nigeria down from the second highest gas flaring nation in 2006 to the seventh position in 2016; Nigeria was flaring 2.5 billion standard cubic feet (scf) of gas, while consuming only 300mscf of gas per day, adding that technology had helped the industry to record a drastic flare down was achieved through aggressive gas commercialization anchored on the Gas Master Plan. The Gas Master Plan was geared towards addressing four key critical issues of gas availability, infrastructure, commercialization framework and gas affordability.- culled from a statement by the NNPC Ndu Ughamadu, Group General Manager, Group Public Affairs Division in April 2, 2017. A statement credited to the NNPC Chief Operating Officer, (COO), Upstream, Mallam Bello Rabi. [www.nnpcgroup.com/public/NNPC-IN-THE-NEWS/Tabid/92/articles/Type/article-V](http://www.nnpcgroup.com/public/NNPC-IN-THE-NEWS/Tabid/92/articles/Type/article-V) on 21/3/18

<sup>45</sup> Brown E.D 'The Role of Law in the prevention of Oil Pollution' in Wodley-Smith(ed). *The Prevention of Oil Pollution*. Cited in Olanrewaju Fagbohun 'The Law of Oil Pollution and Environmental Restoration: A Comparative Review' Odade Publishers. Port Harcourt. Lagos 2010

<sup>46</sup> (1974) 3 ESCLR 486, see also *Oronto Douglas v Shell Petroleum Development (Ltd)*

<sup>47</sup> Cited in Amokaye, G. O 'Environmental Law and Practice in Nigeria' University of Lagos Press (2004)pg 608

<sup>48</sup> Suit No. WW 189/7 cited in Olanrewaju Fagbohun 'The Law of Oil Pollution and Environmental Restoration: A Comparative Review' Odade Publishers. Port Harcourt. Lagos 2010

polluting the land, creeks and fish ponds on the ground that if the injunction is granted, it could stop the defendant trade and render many unemployed and even affect the country's revenue since oil was the main income generator. It is here recommended that the judiciary, as the last hope of the common man courts must be at the fore front of the revolution to move Nigeria away from over dependence on oil for economic sustainability. The standards set by the Indian courts in this area is worthy of note. Notwithstanding that India is still a growing economy like Nigeria, the Indian Supreme Court considering the gravity of environmental hazards associated with exploitation of non-renewable energy, initiated a strict enforcement of environmental legislation by invoking the power under art. 32 and 48 of the Indian Constitution in order to disregard the traditional concept of *locus standi*<sup>49</sup>

The Associated Gas Re-Injection Act have contributed immensely to the drastic reduction of the proportion of natural gas flared, the gain from this was however watered down by the provision of section which made the Minister the sole power to determine the penalties for violations. This is because the power granted to the Minister is likely to be abused therefore; this area of the law should be properly reviewed.

The current state of affairs in the gas industry reveals a clear reluctance on the part of the Nigerian government to prohibit gas flaring in the country. There are many plausible reasons for this status quo which include the concern by the government about the likely effect of such a prohibition on oil operations that may ultimately affect the Nigerian economy ,the huge financial resources required for gas re-injection and the inability of the Government to meet their financial obligations in the various joint ventures, coupled with the lack of required infrastructural facility, and the insistence by the oil and gas companies of their inability to meet the various deadlines. The foregoing reasons notwithstanding, the time is ripe for the government to exhibit political will henceforth and desist from 'sacrificing' its citizens' right to life and a healthy environment for a buoyant economy<sup>50</sup> Cooperation between government agencies and ministries is the first step in a successful renewable energy development. The government and policymakers need to explore renewable energy options such as small hydropower plants across the country, especially in the rural areas. If this is done in the rural areas with flowing small rivers, the communities could be transformed into semi-urban centres.<sup>51</sup>

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<sup>49</sup> Art. 32 empowers the Supreme Court to enforce the right conferred under the constitution and to issue directions or orders writs including writs of habeas corpus, mandamus, prohibition etc. for the enforcement of any right conferred under the constitution. See further *Mc/ Mehta v Kamal Nath &ors. Vellore Citizens Welfare Forum V Union of India*. Culled from SACEP/UNEP/NURAD *Publication Series in Environmental Restoration: Law and Policy* no 3 , Sri Lankan 4-6 July 1997. Cited in Fagbohun, O 'Law of Oil Pollution and Environmental Restoration: A Comparative Review' Odade Publishers, Port Harcourt. (2010)

<sup>50</sup> Dr. Uwem, Udok and Enobong, Bassey A.' Gas flaring in Nigeria: Problems and Prospects' *Global Journal of Politics and Law Research* Vol 5 no 1 pp 16-18, March 2017 retrieved from [www.ejournals.org/wp-content/uploads/gas-flaring-in-nigeria-problems-and-prospects.22/3/18](http://www.ejournals.org/wp-content/uploads/gas-flaring-in-nigeria-problems-and-prospects.22/3/18)

<sup>51</sup> Emodi, N. V., & Yusuf, S. D. Improving electricity access in Nigeria: obstacles and the way forward. *International Journal of Energy Economics and Policy*, 5(1), 335-351. 2015. As cited in Nnaemeka Vincent Emodi,

Some of the challenges that are easily identifiable are high cost of production, inadequate legislation to attract domestic and foreign investments, weak political will from the government, inadequate funding and support for research into the appropriate technology and low public awareness of the benefits and opportunities derivable from use of renewable energy. The main challenge of high cost of production can be overcome by financial support through tax incentives and capital support to investors; technological development in this area can be encouraged through subsidized production. The setting of national targets with strong political backing which can be achieved through research grants and subsidies to agencies and government parastatals in the production and development of required technology.

All of these are achievable with committed and strong government backing and support. For example, loans, research grant and tax incentives as well as creating a market that will remove monopoly and encourage small investors which have been used successfully in other countries can successfully be used in Nigeria if the government is committed and the people determined on realizing the importance of protecting the environment through the use of clean energy.

### **Conclusion**

The challenges confronting the nation on energy management are enforcement of regulations and the ignorance of the average Nigerian. Corruption and lack of political will is also a major challenge. As severally stated, Nigeria is over dependent on fossil fuels and the exploration of fossil fuel is pollution prone. This interdependency necessarily becomes harmful to the environment and does not encourage sustainable development. Environmental Impact Assessment Act of 1992 was promulgated to ensure that the significance effect that an activity will have on the environment before the activity is embarked upon but rather than utilize the assessment in this way, it is usually used to justify a decision after it has been made rarely do assessors consider alternative courses of action at an early stage of the project planning cycle in order to choose the most favourable. Environmental impact assessment is crucial and should be done with all seriousness therefore the review, consultation and participation stages are critical stages.

Several policies like those mentioned above were developed by the Nigerian energy sector for promoting the use of renewable energy to enhance sustainable development. In order to achieve this lofty aim however, the possible challenges have to be identified and means of overcoming those challenges must be identified and explored.