

Fostering Sustainability through Renewable Energy Resource Development: The Law and Policy in Nigeria

Osahon Livewell Omoregie, Ambrose Alli University, Nigeria

The IAFOR International Conference on Sustainability, Energy & the Environment
Hawaii 2020
Official Conference Proceedings

Abstract

Renewable energy sources (RES) exploitation and utilization is the hallmark of sustainable development in any country around the globe. The need to decarbonize Nigeria's energy base through the utilization of RES to ensure sustainability cannot be overemphasized. In the last two decades, the Nigerian Government has shown keen interest in renewable energy resource development by evolving a plethora of policies and plans which articulates certain visions, goals, objectives, targets, and strategies. This paper critically examined these policies with a view to ascertain their efficacy. It was found that the policies are ineffective and inadequate. The paper further revealed that legislation is a pivotal tool to accompaniment and advance policies, but at present, the absence of a legislative framework pose a major challenge to RES exploitation and utilization in Nigeria. The author recommends, among other things, the urgent need to enact a coherent and comprehensive legislative and regulatory framework to drive RES development and deployment in the country.

Keywords: sustainable development, renewable energy, law, policy, Nigeria

iafor

The International Academic Forum
www.iafor.org

Introduction

Nigeria's energy supply is largely based on fossil fuels (Okposin, 2019: 138). Currently, 80% of total energy consumption in Nigeria is derivable from petroleum (oil and gas) (Akorede, et al 2017: 196). In contrast, Nigeria generates a small amount of energy from renewable sources such as hydro power, solar, wind and biomass. Oil and gas are main components of fossil fuels which are finite. Nigeria's reliance on the consumption of fossil fuel resources cannot continue indefinitely. Over reliance on fossil fuels has been a bane of underdevelopment in Nigeria, and if the trend continues, sustainable development will be an illusion (Atsegbua, 2019: 2). Nigeria currently suffers from energy poverty (Dioha, 2017). Fossil fuels are insufficient to sustain the ever increasing demand for energy in Nigeria due to population increase and continuous quest for improved living standards by the citizens¹.

Fossil fuels are also environmentally unfriendly. Its exploration and production is known to be a major anthropogenic activity contributing to climate change². There is growing consensus on the need to abdicate fossil fuels combustion in order to reduce emissions, seek RES utilization to foster sustainability. The need to decarbonize Nigeria's energy base through the utilization of RES to ensure sustainability cannot be overemphasized. A plethora of policies have been evolved and a target of 30% RES utilization by 2030 has been set by government³.

This paper critically examines these policies to ascertain their efficacy. In the paper, the author argues that the policies are ineffective and inadequate. In doing so, the author employs a doctrinal research methodology relying heavily on primary and secondary sources. Apart from the introduction section, the rest of the paper is segmented seriatim: conceptual clarification; sources of energy in Nigeria; renewable energy as a tool for sustainability; critical review of renewable energy policies in Nigeria; challenges and barriers to renewable energy resource development in Nigeria; recommendations; and lastly, conclusion.

Conceptual Clarifications

A conceptual clarification of two key terms is deemed necessary to ensure that the paper is put in proper perspective. The essence is to elucidate their meaning within the context of the paper, rather than to embark on a detailed analysis of these terms or concepts. In the paper, "renewable energy" simply means energy generated from renewable resources through natural process that are infinite on the earth surface and

¹ According to British Petroleum, "population and income are the key drivers behind growing demand for energy". See British Petroleum. (2016). *Energy Outlook 2016*. London: British Petroleum. 11. Nigeria's population is currently the 7th largest in the world, and is projected to become the 3rd most populous country in the world by 2050 with an estimated population of 410.638 million. See United Nations Department of Economic and Social Affairs, Population Division. (2017). *World Population Prospects: The 2017 Revision: Key Findings and Advance Tables. ESA/P/WP/248*. New York: United Nations. 5, 26.

² Intergovernmental Panel on Climate Change (IPCC). (2013). *Fifth Assessment Report (AR5 WG1). Summary for Policymakers, 4*

³ This target is the focus of the National Renewable Energy and Energy Efficiency Policy (NREEEP), 2015. See Energy Commission of Nigeria & Federal Ministry of Science and Technology. (2014). *National renewable energy and energy efficiency policy*. Abuja: Federal Republic of Nigeria.

continuously replenished on a human time scale, such as hydro, solar, wind, rain, tides, waves, ocean energy, geothermal heat, fuel cell, biomass, bio gas, and hydrogen derived from renewable resources (Olawuyi, 2015: 324-327). They are widely accepted to be environmentally friendly and promote sustainable development (Atsegbua, 2008: 5). They are distinct from fossil fuels (a category of non-renewable energy) which are finite resources created by time and pressure compressing organic matter such as the remains of plants and animals into large rocks formations. "Sustainable development" as used in the paper refers to "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"⁴. The term "sustainability" is used interchangeably with the concept of "sustainable development". Closely related to the concept of "sustainable development" is "the concept of sustainable utilization of natural resources" which connotes the proper, efficient and effective use of natural resources in a manner that will promote sustainability (Atsegbua & Daudu, 2019: 7).

Sources of Energy in Nigeria

There are two sources of energy in Nigeria, namely: renewable and non-renewable. Renewable energy sources that are predominant in Nigeria are hydro, solar, wind, biomass and the use of firewood (Atsegbua et al, 2010: 296). There is also prospect of geothermal sources. Hydropower has been in use since the late 1950s for electricity generation; and developments in solar and wind energy are on the increase due to their high potentials and government support arising from recent energy policies and initiatives (Aliyu, Madu & Tan, 2018).

The installed capacity for hydropower has remains stagnant for many years, while the output power has continued to decline due to lack of maintenance and fluctuation in volume of water flowing into reservoirs (Akorede et al, 2017: 204). Solar power as one of the emerging renewable energy in the country has exciting possibilities, and the northern part has the highest potential for solar energy (Aliyu, Dada, & Adam, 2015). Wind power is presently of limited use but showing promising prospects (Adekoya & Adewale, 1992; Adaramola & Oyewola, 2011; Oyedepo, 2012a). The technology for biomass is at its infancy in Nigeria⁵. In 2007, the National Bio-fuel Policy and Incentives was made to facilitate the development and promotion of domestic ethanol fuel. Firewood which is a component of biomass is abundantly used in the rural communities, and its use has an enormous environmental cost (Atsegbua et al, 2010). Geothermal power is unexploited but research shows some Basins have high geothermal gradient potentials (Ikeagwuani, Agbidi & Bamisele, 2015: 731).

Non-renewable energy in Nigeria mainly consists of crude oil, and natural gas. Nigeria currently has an estimated oil reserve of 37.45 billion barrels, 5,627 billion cubic meters of natural gas, and 2.75 billion tonnes of coal and lignite.⁶ Oil is the

⁴ World Commission on Environment and Development. (1987). *Our Common Future*. Oxford: Oxford University Press. (Endorsed by the United Nations General Assembly Resolution 42/187).

⁵ NNPC News. (May 2006) 28(5).

⁶ Organization of the Petroleum Exporting Countries (OPEC). (2018). *Annual Statistical Bulletin 2018*. https://www.opec.org/opec_web/en/press_room/5027.htm. Retrieved February 24, 2019; British Petroleum. (2018). *Statistical review of world energy 2018*. London: British Petroleum; United States Energy Information Administration. (2019). *International energy statistics, 2019*. Washington DC: United States Energy Information Administration; Energy Commission of Nigeria. (2013). *National energy policy* (Draft Revised ed.) , 9, 17.

most widely used fossil fuel in Nigeria (Osueke & Ezugwu, 2011: 1). Daily average production had grown since its first commercial discovery at Oloibiri, (now in present day Bayelsa State) in 1956 to around 2.5 million barrels per day in 2012 (Douglas-Abubakar, Muhammed & Salau, 2019). Dirty coal was hitherto harnessed. There is also potentials for shale hydrocarbons in Nigeria Frontiers and it's Inland Basins (Omorieg, 2017: 82). The environmental degradation arising from crude oil exploration and production in Nigeria cannot be overemphasized. Spills are common and gas flaring is perpetual (Ajugwo, 2013: 6-7), thereby exacerbating land, water, and atmospheric pollution especially in the Niger Delta region; and immensely contributing to climate change. Faring of gas has also led to great economic and biodiversity loss.

Renewable Energy as a Tool for Sustainability

There is inextricable link between energy and sustainable development, and it is evident that energy sustainability is important in order to achieve sustainable development (Oyedepo, 2012b). In light of the above, the United Nations obligates its member states to transit to cleaner and affordable sources of energy⁷. Renewable energy is often referred to as 'clean energy'. All RES are regarded as the 'greenest energy source', it has gained universal acceptance, and favoured as a replacement for fossil fuels energy⁸. Renewable energy sources (RES) exploitation and utilization is the hallmark of sustainable development in any country around the globe. Renewable energy is indeed a tool for sustainability. Its rapid deployment results in significant energy security, climate change mitigation and economic benefit (Bradbrook, 2008: 109-112). If renewable energy resources are effectively and appropriately developed in Nigeria, commercial activities will be boosted, green jobs will create wealth especially for the rural communities, energy security will be assured, and there will be lesser environmental impacts.

Critical Review of Renewable Energy Policies in Nigeria

In the last two decades, the Nigerian Government has shown keen interest in renewable energy resource development by evolving a plethora of policies which articulates certain visions, goals, objectives, targets, and strategies (Omorieg, 2019: 304). These policies include:

National Electric Power Policy (NEPP), 2001

⁷ See United Nations Development Programme, "2030 Agenda for Sustainable Development". Adopted 25th September, 2015, New York, United States of America. <http://un.org/sustainabledevelopment/sustainable-development-goals/>. Goal 7 of the Sustainable Development Goals enhance international cooperation to facilitate access to clean energy. <http://www.unenivonment.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-7>, Retrieved November 9, 2019.

⁸ See the Paris Accord which was adopted on December 12, 2015 at COP21 under the UNFCCC; applicable to all the 198 parties to it (entered into force on November 4th, 2016 and has been ratified by 187 parties as of November 2019), including European Union. See UNFCCC COP21 Session Paris Decision, December 12, 2015/FCCC/CP/2015/L.9/Paras 1-5, at 2. See also Encyclopaedia Britannica, "Paris Agreement: International Treaty (2015)". <https://www.britannica.com/topic/Paris-Agreement-2015#accordion-article-history>. Retrieved December 18, 2019. The accord seek to ensure transformative change in the global energy sector by evolving decarbonization agenda which promotes the use of renewable and energy efficiency.

This policy marks the first step to reform the power sector in Nigeria. It was created in March 2001 and has three main goals, namely: the privatization of the National Electric Power Authority (NEPA) and introduction of the Integrated Power Producers (IPPs) of electricity; encouragement of market competition amongst participants by gradual removal of subsidy; and liberalization of the electricity market. No emphasis was laid on the utilization of renewable energy to generate electricity power (Atsegbua & Erhagbe, 2019: 311).

National Energy Policy (NEP), 2003, 2006, and 2013

It is the first comprehensive energy policy in the Nigeria. This policy document which first came into effect in 2003 has been reviewed severally. The main goal of the policy is to ensure energy security. It serves as a blueprint to foster a robust energy supply mix through the principle of energy diversification (Atsegbua & Erhagbe, 2019: 312). Paradoxically, it endorses the optimal utilization of fossil fuels, and seeks to pursue the development and deployment of renewable energy. Its provision clearly shows weaknesses to effectively transit to clean and affordable energy.

National Economic Empowerment and Development Strategy (NEEDS), 2004

The need to tackle poverty and facilitate national development necessitated the launching of this policy by the Olusegun Obasanjo government in 2004. NEEDS⁹ encapsulates national goals such as employment generation, wealth creation, re-orientation of values, and human resource development, and sustainable natural resource development to meet the nation's economic needs. The development and deployment of renewable energy technologies was aptly considered. However, the policy was marred with poor fiscal policy implementation, lack of transparency, leadership problem, and macroeconomic challenges.

Renewable Electricity Policy Guidelines (REPG), 2006

The policy was developed by the Federal Ministry of Power and Steel in December 2006 to facilitate the expansion of electricity generation from renewable energy sources. It contained lofty objectives for promoting renewable energy in the power sector. Government has however failed in its implementation.

National Bio-fuel Policy and Incentives (NBPI), 2007

It was initiated by the Nigerian National Petroleum Corporation (NNPC). Its main thrust is the utilization of biomass resources mainly agricultural produce to improve the quality of fossil fuel in Nigeria. It establishes the Bio-fuel Energy Commission and a Bio-fuel Research Agency to conduct researches for optimal production of bio-fuels¹⁰. A key component of the policy is the provision of incentives for investors. A major limitation of the policy is its failure to identify means of technological transfer. Another limitation is lack of implementation as the commission it seeks to establish

⁹ National Planning Commission. (2004). *National economic empowerment and development strategies*. Abuja: Federal Republic of Nigeria.

¹⁰ See Federal Republic of Nigeria. (2007). *Official gazette of the Nigerian bio-fuel policy and incentives*. Abuja: Federal Republic of Nigeria.

has yet been established. The Energy Commission of Nigeria seems to have taken up its role.

Renewable Energy Master Plan (REMP), 2005 and 2012

The Renewable Energy Master Plan was developed by the Energy Commission of Nigeria (ECN) in collaboration with the United Nations Development Programme ((UNDP). The policy is implemented by the Ministry of Environment. The document articulates Nigeria's vision for achieving sustainable development. It places premium on renewable energy as a tool to achieve sustainable development. It provides a road map for achieving the renewable energy policy thrust in the NEP 2003. The revised 2012 version contains different programmes of different renewable energy resource exploration; and identifies key issues relating to investment and technology required to drive renewable energy. It articulates strategies to transit from use of fossil fuels to clean, reliable, secure energy supply in Nigeria by integrating 20% of renewable electricity generation into the national grid by 2020, and 10% of Nigeria total energy consumption by 2025¹¹. However, it remains a toothless bulldog in the absence of a specific legislation that can engender its enforcement.

National Renewable Energy and Energy Efficiency Policy (NREEEP), 2015

This policy recognizes the importance of renewable energy to reduce the adverse impact of fossil fuels on the environment. It sets target to increase Nigeria's power generating capacity to 40,000MW; and to integrate renewable energy sources into energy generation in the country. It set a target of achieving 2,438MW in the short term (2013-2015); 8,188MW in the medium term (2016-2020); and 23,134.8MW in the long term (2021-2030) from renewable energy generation and utilization representing a target of 30% RES utilization by 2030¹². It addresses several issues including renewable energy pricing and financing, energy efficiency and conservation, project implementation, research and development, amongst others. The realization of the target set has been hampered by lack of implementation and financial constraints. If the policy is properly implemented, it would facilitate the rapid development and deployment of renewable energy to transit from dirty fossil fuel.

Rural Electrification Strategy and Implementation Plan (RESIP), 2016

This plan was first initiated as Nigeria Rural Electrification Programme in 1981 by the Federal Ministry of Power and Steel, and executed by the scrapped NEPA. The Power Sector Reform Team noting some shortcomings prepared the Rural Electrification Strategy and Implementation Plan in 2006. This was however reviewed and redrafted by a committee in 2014. The initial policy thrust was the extension of the national grid to rural communities in realization that fewer than 20% of rural household have access to electricity. The RESIP now focuses on the expansion of access in clean and affordable manner, thereby encouraging the use of on-grid and off-grid means of electricity supply. If government pursue sustainable utilization of natural resources in the country including the abundant renewable resources in the

¹¹ Energy Commission of Nigeria & United Nations Development Programme. (2005). *Renewable energy master plan*. Abuja: ECN & UNDP.

¹² Energy Commission of Nigeria & Federal Ministry of Science and Technology. (2014). *National renewable energy and energy efficiency policy*. Abuja: Federal Republic of Nigeria.

rural communities in Nigeria, energy poverty will become a thing of the past (Sambo, 2005; Atsegbua & Erhagbe, 2019).

A common thread of incoherence runs through the key provisions of these policies. They contain observable gaps and are marred with several challenges and barriers. Implementation is poor and ineffective. Overlap and duplication of some activities exist amongst the institutions created. Alignment and harmonization of the various policies is deemed imperative to coordinate several policy issues (Atsegbua & Erhagbe, 2019: 319). It is noteworthy that at present, there is no direct legislative framework on renewable energy in Nigeria (Ladan, 2009: 94; Oyedepo, 2012c: 11; Okonkwo, 2013: 738; Oniemola, 2015: 85; Okposin, 2019: 163). The Energy Commission of Nigeria (ECN) Act, Cap. E10, LFN, 2004, and the Electric Power Sector Reform (ESPRA) Act, 2005 do not make specific provisions on the development and utilization of renewable energy in the country. An appropriate legislative framework on renewable energy is a prerequisite for maximizing investment opportunities in the sector (Ladan, 2009: 95; Oniemola, 2011: 5; Chineke, et al, 2015)

Challenges and Barriers to Renewable Energy Resource Development in Nigeria

Identifiable challenges and barriers to renewable energy resource development in Nigeria include:

Inadequate Policies and Lack of a legislative framework

Regulation of renewable energy in Nigeria is largely done at policy level. The existing renewable policies are inadequate and do not provide for legal or fiscal instruments that would attract investment. There are no laws specifically enacted to govern activities and bind government, institutions and stakeholders in in the energy sector in relation to renewable energy (Ladan, 2009: 94; Olawuyi, 2013b; Oniemola, 2015: 85; Mbajiorgu, 2016: 250; Okposin, 2019: 163).

Weak institutional framework, implementation gaps and overlap of roles

Many of the institutions are not productive. Governance is characterized by instability. Thus many of the existing policies poorly implemented. Different government articulates different policies. Furthermore the institutions created have overlap of functions. Poor implementation creates distortions (Emodi & Ebele, 2016: 10).

High cost, insufficient funding and financial constraints

This is another major challenge. It endangers implementation. No stringent measures exist to provide needed funding renewable energy development. Renewable energy technologies are capital intensive, it is imperative that financial and investment barriers be removed otherwise, the price for a developing country like Nigeria becomes enormous (Efurumibe, 2013; Ladan, 2014: 466 - 477; Okposin, 2019:157).

Lack of technological know-how and inefficient technology transfer measures

The Nigeria law on technological transfer- the National office for Technology Acquisition and Promotion Act of 1979 (NOTAP ACT) is inadequate mainly due to its narrow scope. Its technology classification does not include modern day environmentally sustainable technologies (ETS). Secondly, the procedure of transfer of technology are unclear and cumbersome, thirdly, issues of sustainability is not prioritize nor considered. (Olawuyi, 2013a: 7 - 10; Atsegbua et al, 2010: 294).

Absence of adequate Research and Development (R&D)

Public initiatives to drive Research and Development (R&D) is grossly inadequate in the country. There is need for government to invest in R&D activities to enhance technological innovation. Private sector participation is also very important (Efurumibe, 2013; Olawuyi, 2015).

Corruption and poverty

Corruption constitutes a major hindrance to effective implementation of initiatives and projects articulated in the policies. The diversion of public funds is a common occurrence in Nigeria. There is lack of accountability both from government and established institutions (Emodi & Ebele, 2016: 10). Poverty on the other hand, poses a major threat to national development, and hampers sustainable development. Nigeria ranks amongst the poorest countries in the world.

Lack of information, poor public awareness and ineffective standards

The inadequacies of regulatory agencies to provide sufficient information, create public awareness, and ensure standards and quality control constitute another set of significant factors that hamper the development of renewable energy in the country (Emodi & Ebele, 2016). The consequence is the creation of market gap resulting in high risk perception for renewable energy projects and initiatives.

Social-cultural barrier

This is intrinsically linked to societal and personal values and norms affecting perception and acceptance of renewable energy. In this regard, participation in decision making becomes relevant (Igbinovia, 2014).

The challenge of variability

Otherwise referred to as "intermittency problem" is mostly associated with wind and solar resources making it difficult to plan satisfactory in balancing supply with demand. The solution lies in efficient storage and technical balancing to meet heat or power demand changes (Okposin, 2019: 155 - 157).

Recommendations

An urgent enactment of a coherent and comprehensive legislative and regulatory framework to drive renewable energy resource development and deployment in Nigeria is recommended.

The proposed legislation should directly encompass the renewable energy policies that have been put in place, ipso facto, accompaniment them, reflect government commitment to ensuring sustainable development of its natural resources through an increased investment on renewable energy and guarantee investor's assurances.

The proposed legislation should establish a distinct institution to regulate and implement its provisions to avoid overlap of roles with other agencies.

The proposed legislation should provide for mandatory connection of RES to the national grid, and oblige IPPs to generate power from RES.

The proposed legislation should make provisions for fiscal regulation and incentives to attract investors; and promote private sector participation.

There is need for government to also provide effective measures to enhance technological transfer, generate funds, combat corruption, create educational initiatives to promote RES awareness, promote Research and Development (R&D) and address the challenge of poverty.

Conclusion

This paper critically examined the various renewable energy policies in Nigeria. The challenges and barriers inherent therein were discussed. It is evident from the preceding discussion that through the enactment of a coherent and comprehensive legislative and regulatory framework to drive renewable energy resource development and deployment, the various policies on renewable energy would be strengthened, fossil fuel dependence would be reduced, and sustainability would be enhanced in Nigeria.

Acknowledgements

I sincerely acknowledge Dr. Eghosa Ekhaton, Derby Law School, University of Derby, United Kingdom for providing useful comments. I am extremely grateful to Prof. Lawrence Atsegbua, Faculty of Law, University of Benin, Benin City, Nigeria for piquing my interest in Energy and Environmental Law.

References

- Adaramola, M.S., & Oyewola, O.M. (2011). On wind speed pattern and energy potential in Nigeria. *Energy Policy*, 39(5), 2501-2506. doi:10.1016/j.enpol.2011.02.016.
- Adekoya, L.O., & Adewale, A.A. (1992). Wind energy potential of Nigeria. *Renewable Energy Journal*, 2(1), 35-39. doi:10.1016/0960-1481(92)90057-A.
- Ajugwo, A.O., (2013). Negative effects of gas flaring: the Nigerian experience, *Journal of Environment Pollution and Human Health*, 1(1), 6-8. doi:10.12691/jephh-1-1-2.
- Akorede, M.F., Ibrahim, O., Amuda, S.A., Otuoze, A.O., & Olufeagba, B.J. (2017). Current status and outlook of renewable energy development in Nigeria. *Nigerian Journal of Technology*, 36(1), 196-212. doi:10.4314/njt.361.1230.
- Aliyu, A. K., Madu, B., & Tan, C. W. (2018). A review of renewable energy development in Africa: a focus in South Africa, Egypt and Nigeria. *Renewable and Sustainable Energy Reviews*, 81, 2502-2518.
- Aliyu, A. S., Dada, J. O., & Adam, I. K., (2015). Current status and future prospects of renewable energy in Nigeria. *Renewable and Sustainable Energy Reviews*, 48, 336-346.
- Atsegbua, L. & Daudu, S. (2019). Utilization of natural resources in Nigeria: issues and challenges. In L. Atsegbua & S. Daudu (Eds), *Beyond fossil fuels: renewable energy-law and policy* (pp. 6-31). Benin City: Fifers Lane Publishers.
- Atsegbua, L. (2019). Introduction - paradigm shift: from fossil fuels to renewable energy. In L. Atsegbua & S. Daudu (Eds), *Beyond fossil fuels: renewable energy-law and policy* (pp. 1-5). Benin City: Fifers Lane Publishers.
- Atsegbua, L. (January 17, 2008). *Beyond oil and gas: renewable energy, the tale of nature's unidentical twins*. (Being the 92nd inaugural lecture series of the University of Benin). Benin City: University of Benin Press.
- Atsegbua, L., & Erhagbe, E. (2019). Advancing renewable energy development in Nigeria: a legal framework. In L. Atsegbua & S. Daudu (Eds), *Beyond fossil fuels: renewable energy-law and policy* (pp. 310-328). Benin City: Fifers Lane Publishers.
- Atsegbua, L., Akpotaire, V., & Dimowo, F. (2010). *Environmental law in Nigeria: theory and practice*, (2nd ed.). Benin City: Ambik Press.
- Bradbrook, A. J. (2008). The development of renewable energy technologies and energy efficiency measures through public international law. In D. N. Zillman, C. Redgwell, Y.O. Omorogbe, & L.K. Barrera-Hernandez (Eds), *Beyond the carbon economy: energy law in transition* (pp. 109-132). New York: Oxford University Press.

- British Petroleum. (2016). *Energy Outlook 2016*. London: British Petroleum.
- British Petroleum. (2018). *Statistical review of world energy, 2018*. London: British Petroleum.
- Chineke, T., Nwachukwu, R., Nwofor, O., Ugboma E., & Ndukwu O. (2015). Much ado about little; renewable energy and policy. *Journal of International Scientific Publications*, 9, 123-131.
- Dioha, M. (May 30, 2017). Matching Nigeria's energy supply to demand in the era of climate change. *Renewable Energy World*.
- Douglas-Abubakar, J., Muhammed, F., & Salau, O. (2019). *Energy 2019; Nigeria*. In P. Thomson, & J. Derrick (Eds.), *Global legal insight: energy*. (7th ed.). Global Legal Group.
- Efurumibe, E. L. (2013). Barriers to the development of renewable energy in Nigeria. *Scholarly Journals of Biotechnology*, 2(1), 11-13.
- Emodi, N. V., & Ebele, N. E. (2016). Policies enhancing renewable energy development and implications for Nigeria. *Sustainable Energy Journal*, 4(1), 7-16. doi:10.12691/rse-4-1-2.
- Energy Commission of Nigeria & Federal Ministry of Science and Technology. (2014). *National renewable energy and energy efficiency policy*. Abuja: Federal Republic of Nigeria.
- Energy Commission of Nigeria & United Nations Development Programme. (2005). *Renewable energy master plan*. Abuja: ECN & UNDP.
- Energy Commission of Nigeria. (2013). *National energy policy (Draft Revised ed.)*. Abuja: Federal Republic of Nigeria.
- Federal Republic of Nigeria. (2007). *Official gazette of the Nigerian bio-fuel policy and incentives*. Abuja: Federal Republic of Nigeria.
- Igbinovia, F.O. (2014). An overview of renewable energy potentials in Nigeria: prospects, challenges and the way forward. *Energetika Journal*, 46, 570-579.
- Ikeagwuani, I., Agbidi, D.C., & Bamisele, O.O. (2015). Exploration and application of geothermal energy in Nigeria. *International Journal of Scientific and Engineering Research*, 6(2), 726-732.
- Intergovernmental Panel on Climate Change (IPCC). (2013). *Fifth assessment report (AR5 WG1). summary for policymakers*.
- Ladan, M. T. (2009). Policy, legislative and regulatory challenges in promoting efficient and renewable energy for sustainable development and climate change mitigation in Nigeria. In R. Mwebaza, & L. J. Kotze (Eds.), *Environmental*

Governance and Climate Change in Africa: Legal Perspective. (ISS Monograph Series 167) (pp. 93- 102). Pretoria: South Africa.

Ladan, M. T. (2014). Natural resources and environmental law and policies for sustainable development in Nigeria. Zaria: Ahmadu Bello University Press.

Mbajiorgu, K. (2016). Reviewing the legislative framework for renewable energy in Nigeria. Nigerian Institute of Advanced Legal Studies (NIALS) Journal of Environmental Law, 4, 247-278.

National Planning Commission. (2004). National economic empowerment and development strategies. Abuja: Federal Republic of Nigeria.

NNPC News. (May 2006). 28(5).

Okonkwo, P.C. (2013). Sustainable development in a developing economy: challenges and prospects. African Journal of Environmental Science and Technology, 7(8), 738-747.

Okposin, A. E. (2019). Renewable energy utilization and energy efficiency in Nigeria. In L. Atsegbua & S. Daudu (Eds), Beyond fossil fuels: renewable energy-law and policy (pp. 138-166). Benin City: Fifers Lane Publishers.

Olawuyi, D. S. (2013a). Legal and institutional barriers in transfers of environmentally sound technologies into Nigeria through the clean environment mechanism: an overview. Journal of Environmental Law, Institute of Advanced Legal Studies, 3(1).

Olawuyi, D. S. (2013b). Power generation through renewable energy sources: an analysis of the legal barriers and potentials in Nigeria. Journal of Resources, Energy, and Development, 10(2), 105-114.

Olawuyi, D. S. (2015). The principle of Nigeria environmental law, (Revised ed.). Ado Ekiti: Afe Babalola University Press.

Omoriegbe, O. L. (2017). Prospective shale oil and gas development in Nigeria: the two sides of the coin - counting the potential benefits and environmental cost. Ambrose Alli University Law Journal, 12(1), 70-95.

Omoriegbe, O. L. (2019). Shale development vs. renewable energy resources: imperatives for Nigeria. In L. Atsegbua & S. Daudu (Eds), Beyond fossil fuels: renewable energy-law and policy (pp. 256-309). Benin City: Fifers Lane Publishers.

Oniemola, P.K. (2011). Integrating renewable energy into Nigeria's energy mix through the law: lessons from Germany. Renewable Energy Law and Policy Review, 2, 29.

Oniemola, P.K. (2015). Powering Nigeria through renewable electricity investments: legal framework for progressive realization. Afe Babalola University Journal of Sustainable Development Law and Policy, 6(1), 83-108.

Organization of the Petroleum Exporting Countries (OPEC). (2018). Annual statistical bulletin 2018. https://www.opec.org/opec_web/en/press_room/5027.htm

Osueke, C.O. & Ezugwu, C.A.K. (2011). Study of Nigeria energy resources and its consumption. *International Journal of Scientific and Engineering Research*, 2(12), 121-130.

Oyedepo, S. O. (2012a). Efficient energy utilization as a tool for sustainable development. *International Journal of Energy and Environmental Engineering*, 3(1), 11. doi.10.1186/2251-6832-3-11.

Oyedepo, S. O. (2012b). On energy for sustainable development in Nigeria. *Renewable and Sustainable Energy Reviews*, 16(5), 2583-2598.

Oyedepo, S. O. (2012c). Energy and sustainable development in Nigeria: the way forward. *Energy, Sustainability and Society*, 2(15), 1-17. doi.10.1186/2196-0567-2-15.

Oyedepo, S. O. (2014). Towards achieving energy for sustainable development in Nigeria. *Renewable and Sustainable Energy Reviews*, 34, 255-272.

Sambo, A. S. (2005). Renewable energy for rural development, the nigerian perspective. *ISECO Science and Technology Vision*, 1(12), 12-22.

Sambo, A. S. (2009). The place of renewable energy in the Nigerian energy sectors. (Paper presentation at the World Future Council Workshop on Renewable Energy Policies). Addis Ababa, Ethiopia.

United Nations Department of Economic and Social Affairs. (2017). Population division, world population prospects: the 2017 revision: key findings and advance tables. ESA/P/WP/248. New York: United Nations.

United Nations Development Programme. (2015). 2030 agenda for sustainable development. <http://un.org/sustainabledevelopment/sustainable-development-goals/>.

United States Energy Information Administration. (2019). International energy statistics, 2019. Washington DC: United States Energy Information Administration.

World Commission on Environment and Development. (1987). *Our Common Future*. Oxford: Oxford University Press.

Contact email: olomoregie@gmail.com;
osahonomoregie@aauekpoma.edu.ng