THE ENVIRONMENT AND ENERGY SOURCES: LEGAL PERSPECTIVES ON RENEWABLE ENERGY IN NIGERIA *

Abstract
This work studied the concept of environment and energy sources with a focus on renewable energy in Nigeria. It highlighted the nature of these concepts and made an indepth analysis of the relationship between them. The benefits, impacts and obstacles to the development of renewable energy in Nigeria were also analyzed in this work. This paper highlighted the legal framework for renewable energy under Nigerian and international law. At the end, this paper found that Nigeria has great potential to become the renewable energy hub in Africa and recommended that the course of renewable energy activities should always be evenly balanced with the articulation and enforcement of adequate regulations towards achieving sustainable development in the Nigerian energy sector.

Keywords: environment; energy; renewable energy; international law

1. Introduction

Energy is central to all human activities and is needed to support development.[1] It is fundamental to the fulfillment of basic individual and community needs such as lightning, transportation, provision of water, food, health and education. Since all these services are indices by which a nation's progress and development are measured, it then follows that energy is the major determinant of every country's economic and social development.[2] Energy is the mainstay of Nigeria's economic growth and development. It plays a significant role in the nation's international diplomacy and it serves as a tradable commodity for earning the national income, which is used to support government development programmes. It also serves as an input into the production of goods and services in the nation's industry, transport, agriculture, health and education sectors, as well as an instrument for politics, security and diplomacy.[3] Fossil fuels have long been the mainstream of energy supply across the globe due to the high level of dependency of many countries on fossil fuels as their major sources of energy and foreign exchange earnings with the corresponding oil booms. Fossil fuel usage, unsustainable globally, has been recognized as a source of greenhouse gas (GHG) emissions. The environment is under threat from crude oil exploration and exploitation, because of the gradual warming up of the earth's atmosphere and depletion of the ozone layer resulting from increased GHGs emitted into the air.[4] In Nigeria, humans, flora and fauna have suffered greatly due to the environmental pollution and degradation resulting from the incidence of oil exploration activities in the Niger Delta region of Nigeria.[5] These concerns informed the global search for alternative energy sources, hence the premium on renewable energy. As such, the renewable energy has come to constitute a panacea of different sorts, offering solution to every problem posed by conventional energy sources. These sources are clean, safe, and inexhaustible, less damaging and even satisfy the criteria for sustainability prescribed by the United Nations, that is, the ability to meet the energy needs of the present generation without compromising the ability of the future generation to meet their own needs.[6]

Renewable energy holds great potentials for Nigeria's future energy sustainability and a cleaner environment. As the country's population continues to increase, it is expected that the energy needs of the country will become unprecedented in the near future, hence the need for increased exploitation of her renewable energy sources.[7] Since the use of any source of energy has some environmental cost, legal regulation and enforcement of best practices remain the key to a sustainable environment. Put differently, the drive towards the realization of sustainable development in the Nigerian renewable energy industry must be matched with the articulation and enforcement of such policies and legal rules that enhance the condition of the environment.

2. The Environment

Generally, the term 'environment' is inherently technical in scope and application. This generally accounted for difficulties in finding a uniform and generally acceptable definition of the terminology.[8] Thus, a plurality of definitions of the term 'environment' exist in different treaties, declarations, code of conducts, legal instruments and statutes as each attempted to define the term in ways which express the full extent and role of its purpose to the society.[9] The Oxford Advanced Learner's Dictionary defines the term 'environment' as "the conditions that affect the development of something; the physical conditions that something exists in; …the natural world in which people, animals and plants live…."[10] The word environment is derived from an ancient French word *environner*, meaning to encircle.[11] Environment, in ordinary usage, is defined as our surroundings, especially material and spiritual influences which affect the growth, development and existence of a living being.[12] According to Shelton and Kiss,

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[1] AI Kankara, 'Energy-Environment Interactions: Potentials and Problems of Renewable Energy in Nigeria', (2013) 3(1) *Advance in Electronic and Electric Engineering*, 25 – 30, 25.
[2] OV Ojo, 'An Overview of the Legal and Regulatory Framework for Renewable Energy Projects in Nigeria: Challenges and Prospects', (2017) 1(1) *Unilag Law Review*, 22 – 47, p. 23.
[3] SO Oyedepo, 'On energy for Sustainable Development in Nigeria', (2012)16 *Renewable and Sustainable Energy Reviews*, 2583 – 2598, p. 2584.
[4] OJ Olujobi and T Olusola-Olujobi, 'Nigeria: Advancing the Cause of Renewable Energy in Nigeria's Power Sector Through its Legal Framework', (2020)50 *Environmental Policy and Law*, 433 – 444, p. 433.
[5] OJ Olujobi, *et al*, 'Oil Spillage in Nigeria's Upstream Petroleum Sector: Beyond the Legal Frameworks', (2018) 8(1) *International Journal of Energy Economics and Policy*, 220 – 226.
[6] OV Ojo, *op. cit*, p. 24.
[7] M Amadasun, 'The Nigerian Electricity Supply Industry: Status, Challenges and Some Ways Forward', <http://akindelano.com/wp-content/uploads/2014/03/Lecture-on-Nigerian-Electricity-Supply-Industry-19051 2.pdf> Last accessed on 13th May, 2021.
[8] OG Amokaye, *Environmental Law and Practice in Nigeria* (Akoka: University of Lagos Press, 2004) p. 3.
[9] *Ibid*.
[10] S Wehmeier (ed), *Oxford Advanced Learner's Dictionary of Current English* (6th edn, Oxford: Oxford University Press, 2000) p. 389.
[11] D Shelton & A Kiss, *Judicial Handbook on Environmental Law* (Stevenage: Earth Print, 2005) p. 4.
[12] OG Amokaye, *op. cit.*

> By broadly applying to surroundings, environment can include the aggregate of natural, social and cultural conditions that influence the life of an individual or community. Thus, environmental problems can be deemed to include such problems as traffic congestion, crime, and noise.[13]

This view is in consonance with that offered by Wilkinson and Wyman to the effect that the term 'environment' refers to all the interesting factors and circumstances that surround, influence and direct the growth and behaviours of individual beings, groups, species and communities.[14] This general definition is rejected by Bell as too sweeping and subjective because it encompasses any relative object within any given surroundings.[15] Environment has also been defined as a product of man's understanding and experience of his surroundings, and is perpetually shaped by man's usage and interaction with it.[16] Hence, the United Nations Stockholm Conference on Human Development asserted that, "man is both creature and moulder of his environment which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth."[17] Also, the United Nations General Assembly (UNGA), in adopting the environmental ideals in the World Charter for Nature,[18] emphasized the centrality of man to the environment. The UNGA declared that man is part of nature and his life depends on the uninterrupted functioning of the natural system which ensures the supply of energy and nutrients to man.[19] Environment has also been viewed as a complex relationship existing between the ecosystem and its inhabitants.[20] Scientific explanation contends that environment is the product of a complex ecological system in which human beings and other living and non-living organisms co-exist. In this context, environment is characterized and classified into two broad categories: physical and cultural.[21] The physical environment is the natural environment, which consists of the biosphere, atmosphere, hydrosphere, lithosphere and their inherent resources.[22] The cultural environment generally encompasses the way of life of a set of people in a specific location including human settlements, cultural, historical and religious aspects of human activities.[23] This holistic definition of environment accords with that offered by the International Union for Conservation of Nature (IUCN) when it defined the environment as the totality of nature and natural resources, including the cultural heritage and the infrastructure essential for socio-economic activities.[24]

Environment is perceived today in its totality by the recognition of the intrinsic relationship between man and natural environment and the quest to secure harmonious relationship with one another.[25] Kalu, in apparent support of this position, defined 'environment' as comprising prevalent human attitudes, organizational arrangements or dispositions, governmental policies and programs, as well as socio-cultural and economic forces.[26] Indeed, statutory definition of environment in most legal instruments is extensive and integrative in nature and incorporates the natural, human and non-living inhabitants of the planet.[27] For example, the National Environmental Standards and Regulations Enforcement Agency (Establishment) Act[28] defines environment as including water, air, land and all plants and human beings or animals living therein and the relationships, which exist among these or, any of them. Similarly, the International Convention on Civil Liability for Environmental Damage includes in its definition of 'environment' natural resources both 'biotic' and 'abiotic' thus extending the scope of environment not only to the natural environment but also to the man-made environment, including man-made landscapes, buildings and objects which form part of man's cultural heritage. The definition also recognizes the interaction

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[13] D Shelton & A Kiss, *op. cit.*

[14] FF Wilkianson & M Wyman (eds), *Environmental Challenge: Learning from Tomorrow's World* (London: Althouse Press, 1986) p. 1. See also JG Rau & DC Wooten (eds), *Environmental Impact Analysis Handbook* (New York: McGraw Hill, 1980) p. 3.

[15] S Ball & S Bell, *Ball & Bell on Environmental Law* (2nd edn, London: Blackstone Press Ltd, 1991) p. 4.

[16] OG Amokaye, *op. cit*, p. 4.

[17] United Nations, *Report of the United Nations Conference on Human Development and Environment, Stockholm 1972* (New York, 1972), p. 3, cited in OG Amokaye, *ibid*.

[18] UNGA Resolution 7 (XXXVII) of 28th October 1982, cited in OG Amokaye, *ibid.*

[19] *Ibid*.

[20] OG Amokaye, *ibid.*

[21] *Ibid.* The legal approach to definition of the 'environment' is to separate regulations into broad categories. Salter has suggested three groups. Under a heading of 'natural environment', protection of environmental media is included. A second category is the 'man-made environment' including the cultural heritage. A third category concerns 'human environment', including regulations on food content, products, safety issues, leisure and economic health (consumer protection, eco-labelling, and so forth). Further categories could be indoor and working environment, but in Salter's distinctions these should probably be treated as sub-categories of the 'man-made environment'. See JR Salter, 'European Environmental Law' in *International Environmental Law and Policy Series*, (1994) cited in M Larsson, 'Legal Definitions of the Environment and of Environmental Damage', <http://www.scandinavianlaw.se/pdf/38-7.pdf> Last accessed on 13th February, 2021. Rodgers uses the categories of 'human' (including health, social and other man-made conditions) versus 'natural' (including the physical condition of the land, air and water) environment. See WH Rodgers, *Environmental Law* (St. Paul: West Publishing Co., *1977)* p. 1. Backer uses the categories social, physical, internal (working environment) and external (natural) environment. See IL Backer, *Innføring i naturressurs- og miljørett* (2 utg, Oslo: Ad Notam Forlag, 1995) p. 25. Sands notes 'four possible elements' included in international acts, '(a) fauna, flora, soil, water, and climatic factors; (b) material assets (including archaeological and cultural heritage) (c) the landscape and environmental amenity; and (d) the interrelationship between the above factors.' See *P Sands, Principles of International Environmental Law* (*Vol. 1,* Manchester: Manchester University Press, *1995*) p. 629.

[22] This accords with the view expressed by Shelton and Kiss that geographically, environment can refer to a limited area or encompass the entire planet, including the atmosphere and stratosphere. See D Shelton & A Kiss, *op. cit.*

[23] JG Rau & DC Wooten (eds), *op. cit.*

[24] OG Amokaye, *op. cit.* According to the International Court of Justice (ICJ), 'Environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn.' See the case of *Legality of the Threat or Use of Nuclear Weapons,* Advisory Opinion, ICJ Reports, 1996, pp. 241 – 242.

[25] OG Amokaye, *op. cit*, p. 5.

[26] I Kalu, *Disability and Human Rights: Issues and Prospects for Development* (Lagos: Pan Cerebra, 2004), p. 11.

[27] *Ibid.*

[28] National Environmental Standards and Regulations Enforcement Agency (Establishment) Act No. 25 of 2007 (as amended 2018), s. 37. This Act repealed the Federal Environmental Protection Agency Act, Cap. 131 *Laws of the Federation of Nigeria* 1990, Cap. F10 *Laws of the Federation* 2004. The definition of 'environment' in s. 37 of the NESREA Act is *ipsissima verba* with that of s. 38 of the repealed FEPA Act. The 1991 Bulgarian Environmental Protection Act (as amended 2001), in s. 1(1), defines 'environment' as a complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, human health, the cultural and historical heritage and the landscape. Also, the 1993 Slovenian Environmental Protection Act, in Art. 5(1), defines 'environment' as that part of nature which is or could be influenced by human activity.

among various elements of the environment.[29] Thus, the 'environment' includes the ways in which the environmental media interact with one another and the ways in which they interact with the man-made environment, the fauna and flora which inhabit them.[30]

3. Energy

Energy has been defined as the property that must be transferred to an object in order to perform work on, or to procure a rise in the temperature of the object.[31] Energy comes in various forms and include kinetic, potential, mechanical, chemical, electric, magnetic, radiant, nuclear, ionization, elastic, gravitational, rest, thermal, heat, solar, etc.[32] People have always used energy to do work for them. Thousands of years ago, early humans burned wood to provide light, heat their living spaces, and cook their food. Later, people used the wind to move their boats from place to place. More than one hundred thirty-five years ago, people began using falling water to make electricity. Today, people use more energy than ever from a variety of sources for a multitude of tasks and our lives are undoubtedly better for it. Our homes are comfortable and full of useful and entertaining electrical devices. We communicate instantaneously in many ways. We live longer, healthier lives. We travel the world, or at least see it on television and the internet.[33] The energy sources we use today are classified into two broad groups: non-renewable and renewable. Non-renewable energy sources include coal, petroleum, natural gas, propane, and uranium. They are used to generate electricity, to heat our homes, to move our cars, and to manufacture products from candy bars to cell phones. These energy sources are called non-renewable because they cannot be replenished in a short period of time. Renewable energy sources include biomass, geothermal, hydropower, solar, and wind. They are called renewable energy sources because their supplies are replenished in a short time. We use renewable energy sources mainly to make electricity.

4. Renewable Energy

'Renewable energy' may be defined as energy that comes from resources which are naturally replenished on short timescales such as sunlight, wind, rain, tides, waves and geothermal heat.[34] Twidell and Weir define renewable energy as "energy obtained from the continuous and repetitive currents of energy recurring on the natural environment."[35] Furthermore, TREIA offered an acceptable definition of the concept of renewable energy which has been adopted by the Texas Legislature and is as follows;

> Renewable energy is any energy resource that is naturally regenerated over a short time scale and derived directly from the sun (such as thermal, photochemical, and photoelectric), indirectly from the sun (such as wind, hydropower, and photosynthetic energy stored in biomass), or from other natural movements and mechanisms of the environment(such as geothermal and tidal energy). Renewable energy does not include energy resources derived from fossil fuels, waste products from fossil sources or waste products from inorganic sources.[36]

Thus, in contrast to fossil fuels, renewable energy is environment-friendly, ubiquitous, self-replenishing, infinite and consequently, considered as the way to the future. There are a number of unexplored renewable energy opportunities available in Nigeria. These include biomass/bio-fuels, wind, solar and hydropower, to name but a few.[37] 'Biomass' refers to the biological material that may serve as a source of renewable energy. It is derived from living organisms. Different forms of biomass can be burned or digested to produce energy. One of the most common is ethanol, derived from fermenting and distilling starchy cereals, grains and crops such as beet, wheat, corn, sorghum and sugarcane.[38] Another biofuel, biodiesel, is derived by converting oil-bearing crops (including coconut, soy, palm, rapeseed, sunflower) and even chaff, wood and straw to methyl esters to blend with conventional diesel.[39] Biogas is another biofuel which is obtained from unprocessed and discarded materials such as animal faeces, and biodegradable manufacturing and domestic solid waste materials.[40] Wind energy is another source of renewable energy and is obtained from the installation of wind turbines in wind farms in areas where winds are durable and persistent, for instance in offshore and high-altitude locations. The wind turbines are run by airflows and the power production depends on the cube of the wind velocity; as the wind velocity intensifies, the energy production increases.[41] Hydropower or hydroenergy, simply put is energy derived from the force of falling water from reservoirs, waterfalls or dams, or running water from rivers or streams channeled through water turbines.[42] The pressure of the flowing water on the turbine blades causes the shaft to rotate and the rotating shaft drives an electric generator which converts the motion of the shaft into electrical energy. Most commonly, water is dammed and the flow of water out of the dam to drive the turbines is controlled by the opening or closing of sluices, gates or pipes. This is commonly called penstock.[43] Geothermal energy is another alternative. It is obtained by tapping into the high temperature of the earth kilometres deep into the earth's crust in some places or just metres deep in other places. [44] Solar energy is obtained from the

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[29]1993 International Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment (1993)32 ILM 1228, Art. 2(10).

[30]Other notable international bodies, such as the European Economic Commission (EEC) adopt this holistic definition when it defines environment as 'the combination of elements whose complex interrelationships make up the settings, surroundings and conditions of life of the individual and of the society as they are and as they are felt.' See EEC Council Regulation No. 1972/84 of 28th June 1984 on 'Community Action Programme on the Environment', cited in OG Amokaye, *op. cit.*

[31] RL Lehrman, 'Energy is not the Ability to do Work', (1973) 11(1) *The Physics Teacher*, 15 – 18, 15.

[32]V Smil, *Power Density: A Key to Understanding Energy Sources and Uses* (Massachusetts: The MIT Press, 2008) p. 3. Also see S Crosbie, *The Science of Energy – A Cultural History of Energy Physics in Victorian Britain* (Chicago: University of Chicago Press, 1998) p. 7.

[33]The NEED Project, 'Introduction to Energy', available at <https://www.need.org/Files/curriculum/infobook/I ntroS.pdf> accessed on 14th May, 2023.

[34] OV Ojo, *op. cit*, p. 25.

[35] G Boyle (ed), *Renewable Energy: Power for a Sustainable Future* (2 Edn, Oxford: London, 2004) p. 10.

[36]Texas Renewable Energy Industries Alliance, 'Definition of Renewable Energy', available online at <http://www.treia.org/renewable-energy-defined/> accessed on 26th April, 2023.

[37] OJ Olujobi and T Olusola-Olujobi, *op. cit*, p. 436.

[38]AO Yusuf, 'The Nigerian Fuel Ethanol Industry', Paper presented at the International Conference on Bio-Fuel Markets in Africa held in Cape Town, South Africa, 30th November 2006 – 1st December 2006.

[39]B Piters, 'How Sustainable are Biofuels? Between Common Curiosity and Confronting Interests', (2010), cited in OJ Olujobi and T Olusola-Olujobi, *op. cit*, p. 437.

[40] OJ Olujobi and T Olusola-Olujobi, *op. cit*, p. 437.

[41] *Ibid.*

[42]SK Sahdev, *Basic Electrical Engineering* (Noida: Pearson, 2015) p. 78. Also see H Selin (ed), *Encyclopedia of the History of Science, Technology and Medicine in Non-Western Cultures* (2nd edn, Berlin: Springer, 2008) p. 282.

[43] *Ibid.*

[44] OJ Olujobi and T Olusola-Olujobi, *op. cit*, p. 437.

sun through devices such as photovoltaics, which receive and convert solar radiation and heat into a usable energy source. Solar energy is used directly and indirectly for space heating and cooling, day lighting, water heating and steam generation for commercial energy generation. This is abundantly present in Nigeria due to abundant amounts of sunshine.[45]

5. Benefits of Renewable Energy Development

Currently, there exists a strong new interest in renewable energy sources, which hold some attractions not found in fossil fuels.[46] This new interest, no doubt, derives from the numerous benefits of renewable energy. Firstly, renewable energy enhances energy security which is currently under threat due to the spiraling oil prices, crude oil theft and pipeline vandalisms, depletion of oil reserves and the increasing cost of crude oil exploration activities – all pointers to the fact that the availability of fossil fuels may not be guaranteed forever. A diversified energy programme would allay the fears of energy insecurity and unsustainability in Nigeria.[47] Another economic benefit of renewable energy is that its costs are relatively low compared to the costs of extracting, tapping and harnessing energy from fossil fuels. In terms of financial expenditure, alternative energy would become cheaper than fossil fuel. Environmentally, pollution and degradation as well as the global warming of the atmosphere are all associated with the exploitation and usage of fossil fuels, while renewable energy is environmentally friendly. Thus, increased use of renewable energy will improve the quality of the environment by contributing to a global reduction in GHG emissions.[48] Another benefit of renewable energy is its sustainability. Renewable energy is naturally restocked. The collection, transformation and consumption of renewable energy may often take place in an ecologically friendly manner.[49] Excessive reliance on and expectation of the continuation of crude oil revenues has affected the growth of alternative energies in Nigeria. Energy diversification will promote energy security for the country. The international demand for Nigeria's crude oil is declining. The need for the enhancement of alternative energies from other domestic energy resources should be exploited. Energy diversification will enhance the availability of viable energy from alternative sources in a sustainable and ecologically friendly manner and reduce excessive reliance on petroleum products for energy needs. Among the expected benefits of the diversification of energy are expansion of the rural economy, security of energy supply, a better environment and maximising carbon credit opportunities. It would provide direct and indirect employment in the new industry, free up more crude oil for exports, boost Federal and state government tax revenues, and provide a return on investment to farmers and other stakeholders in the sector. It would create different and more beneficial opportunities for direct foreign investments into the Nigerian economy.[50]

6. Impacts of Renewable Energy Development on the Environment

Clearly, renewable energy has overwhelming benefits, but it is not devoid of side effects. For example, although renewable energy technologies are often characterized by lower levels of air-pollutant emissions during production, the consumption of some of them (especially bio-fuels) may emit pollution through combustion.[51] Thus, they may still pose some level of threat to the environment and human health.[52] Many of the ecological and environmental impacts of renewable energy development are associated with land use and land use change which affect local, regional and global ecological and environmental systems. Land use is management of land resources for economic benefit and includes tillage, maintenance and harvest activities as well as conservation practices. Land use change (LUC) includes conversion of native ecosystems into agricultural use, as well as switching from one crop type to another. Also included in the LUC category is diversion of food crops grown primarily for food into bioenergy feedstock use, for example, corn grain.[53] With increased development in renewable energy, land which ordinarily would be available for production of other conventional commodity crops may have to be given up for development of bioenergy feedstock, or for construction of reservoirs. This will invariably upset the eco-balance with significant effects on soil and water quality, habitat change, endanger food security, etc.[54] To meet the demands for bio-fuels, some countries have seen their environment degraded through deforestation, soil erosion and other factors. This puts biomass in conflict with the aims of finding alternative sources of energy.[55]

The establishment of dams usually results in the flooding which in turn leads to loss of land and settlement in upstream catchments. This leads to the displacement of people, loss of cultural artefacts, economic trees and other land resources. People displaced by the flooding suffer substantial loss since the option of resettlement cannot restore them to their original status *vis-a-vis* their lost heritage.[56] Also, artificial pulses generated by dam releases is recognized as a major cause of plant loss and forest destruction.[57] The establishment of dams also leads to a reduction in downstream annual flooding and this affects the natural productivity of riparian areas, floodplains and deltas.[58] Converting native habitats to croplands, for example, can lead to releases of CO_2 into the atmosphere due to burning of vegetation for land clearing.[59] Also, the microbial decomposition of organic matter leads to the release of CO_2 into atmosphere. In the case of clearing of new land (i.e. native habitat) for biomass production, the amount of GHG emissions will depend on the ecosystem

[45] *Ibid.*
[46] *Ibid*, pp. 436 – 439.
[47] *Ibid.*
[48] *Ibid.*
[49] *Ibid.*
[50] *Ibid.*
[51] R Steenblik, 'Liberalisation of Trade in Renewable-Energy Products and Associated Goods: Charcoal, Solar Photovoltaic Systems, and Wind Pumps and Turbines', (2005)7 *OECD Trade and Environment Working Papers*, cited in OJ Olujobi and T Olusola-Olujobi, *op. cit*, p. 439.
[52] OJ Olujobi and T Olusola-Olujobi, *op. cit*, p. 439.
[53] M Ikyaator, 'Problems and Prospects of Adopting Bio-energy Technology in Nigeria', <https://www.academia.edu/12338371/problems_and_prospects_aof_adopting_bioenergy_technology_in_Nigeria> Last accessed on 30th April, 2023.
[54] *Ibid.*
[55] OJ Olujobi and T Olusola-Olujobi, *op. cit*, pp. 436 – 439.
[56] G Mccartney *et al*, 'Dams, Ecosystem Functions and Environmental Restoration' in JK Okoye and PM Achakpa, 'Background Study on Water and Energy Issues in Nigeria to Inform the National Consultative Conference on Dams and Development', <http://www.unep.org/dams/files/nigeria_final_report _on_background_study_22_may_07.pdf> Last accessed on 13th February, 2023.
[57] A Smith, 'Environmental Issues and River Corridor–Management', (1991) 5(3) *Journal of Institution of Water and Environmental Management*, 348 – 358, 350.
[58] JK Okoye and PM Achakpa, *op. cit.*
[59] *Ibid.*

being converted. In some cases, the amount of CO_2 emitted will be large and will require decades if not hundreds of years to be sequestered again by bioenergy crops or native vegetation.[60] Hydroenergy development usually results in an increase in the emission of GHG from reservoirs due to rotting vegetation and carbon inflows from the catchment.[61] Emission of air pollutants from biopower combustion and burning of biofuels potentially impacts water quality mostly via precipitation.[62] Water use during bioenergy processes potentially has the greatest effect on water availability and water quality. Biopower generation requires the use of water for energy generation.[63] Some biopower plants use water for cooling, particularly in co-firing of coal or natural gas with biomass. Water is also required during fermentation of ethanol and in post-transesterification of biodiesel. Water use for these processes deplete surrounding surface or groundwater supplies and limit their availability for other uses including drinking water, wildlife habitat, and recreation.[64] Also, where effluents from these processes are not properly treated and are discharged into nearby surface waters, they contaminate such water bodies.

7. Legal Framework on Renewable Energy Development

The legal framework on renewable energy development refers to the rules and regulations laid down by law to regulate renewable energy activities towards the preservation and maintenance of the environment.[65] These standards are typically set by government and may differ depending on the type of activity. It can include the prohibition of specific activities, mandating the frequency and methods of monitoring of specific activities, and requiring of permits for specific activities.[66] The legal framework on renewable energy development includes the rules and regulations under Nigerian law and those made under international law.

Nigerian Legal Framework on Renewable Energy

The Constitution

The 1999 Constitution of the Federal Republic of Nigeria (as amended), in section 20 thereof provides that the State shall protect and improve the environment, and safeguard the water, air, land, forest and wild life in Nigeria. Thus, there is a duty on the State to protect lives, properties and the environment against any adverse effects from renewable energy activities.[67] Indeed, in the case of *Jonah Gbemre v Shell Petroleum Development Co. Nig. Ltd & Ors*,[68] the Federal High Court per C.V. Nwokorie, J. held that the fundamental rights to life and dignity of the human person as provided in sections 33(1) and 34(1) of the 1999 Constitution of Nigeria inevitably include the right to a clean and pollution-free environment. By virtue of section 2(2) of the 1999 Constitution of the Federal Republic of Nigeria (as amended 2018), Nigeria operates a federal system of government. In consonance with established principles of federalism, there is division of legislative powers between the federal and state governments in Nigeria.[69] By Items 13 and 14, Part II of the Second Schedule of the 1999 Constitution, both the National and State Houses of Assembly have concurrent powers to make laws regulating all matters relating to electrical energy albeit from renewable energy sources and this power extends even to environmental and other issues arising from or connected with such matters.[70]

Environmental Impact Assessment Act[71]

The Act mandates any person or body intending to undertake any project likely to affect the environment to consider at an early state, the impact of such project on the environment.[72] Put differently, where the extent, nature or location of a proposed project or activity is such that it is likely to significantly affect the environment, environmental impact assessment is required in accordance with the dictates of the Act.[73] Before execution, the proponent of the proposed project must apply in writing to the National Environment Standards and Regulations Enforcement Agency (NESREA).[74] Upon application, NESREA determines whether or not the proposed activity is likely to have adverse impact on the environment and whether or not such impacts can be mitigated, in which case it prescribes measures to prevent or mitigate the effects.[75] The Act placed 19 activities on the mandatory study list.[76] The said list is contained in the Schedule to the Act. While paragraph 13 of the said Schedule to the Act expressly places hydroenergy activities on the mandatory list, paragraph 18 thereof impliedly puts bioenergy activities on the said list. Before any project connected to any of the items included on the mandatory list is executed, an environmental impact assessment must be undertaken by the proponent of such project. The Act also specifies the

[60]C Williams, 'Ecological and Environmental Impacts of Bioenergy', <http://www.wgbn.wisc.edu/conservatio n/ecological-and-environmental-impacts-bioenergy> Last accessed on 25th February, 2023.
[61] JK Okoye and PM Achakpa, *op. cit.*
[62] M Ikyaator, *op. cit.*
[63] *Ibid*,
[64] *Ibid*.
[65] K Pinkau, *Environmental Standards: Scientific Foundations and Rational Procedures of Radiological Risk Management* (Berlin: Springer, 1998) p. 45.
[66]ZJB Plater, 'Human-Centered Environmental Values *Versus* Nature-Centric Environmental Values: Is This the Question?' (2014) 3(2) *Michigan Journal of Environmental & Administrative Law*, 273 – 290, 274.
[67] This constitutional duty is however not directly justiciable. See *ibid*, s. 6(6)(c).
[68] (Unreported) judgment in Suit No. FHC/B/CS/53/2005 delivered by the Federal High Court, Benin Judicial Division.
[69] 1999 Constitution of the Federal Republic of Nigeria (as amended 2018), s. 4.
[70]However, by virtue of the doctrine of covering the field, if any law enacted by the House of Assembly of a State is inconsistent with any law validly made by the National Assembly, the law made by the National Assembly shall prevail and that other law shall to the extent of the inconsistency be void. See the 1999 Constitution of the Federal Republic of Nigeria (as amended 2018), s. 4(5); *A-G Abia State v A-G Federation* [2002]6 NWLR (pt. 763) 264 SC.
[71] Cap. E12 *Laws of the Federation of Nigeria* 2004.
[72] *Ibid*, s. 2(1).
[73] *Ibid*, s. 2(2).
[74]*Ibid*, s. 2(4); National Environmental Standards and Regulations Enforcement Agency (Establishment) Act No. 25 of 2007 (as amended 2018), ss. 35 & 36. Originally, the defunct Federal Environmental Protection Agency (FEPA) was the institution authorized to receive application for environmental impact assessment pursuant to section 2(4) of the Environmental Impact Assessment Act. However, the National Environmental Standards and Regulations Enforcement Agency (Establishment) Act No. 25 of 2007 (as amended 2018), s. 36 repealed the Federal Environment Protection Agency Act, Cap. F10 *Laws of the Federation of Nigeria* 2004.
[75] Environmental Impact Assessment Act, s. 21.
[76] *Ibid*, ss. 12 – 14 & 23. See also the Schedule to the Act.

minimum matters to be included in an environmental impact assessment report.[77] NESREA has powers to make an application to a Court of competent jurisdiction for an order of injunction to restrain any person who has or is likely to contravene a prohibition under the Act from carrying out an activity which will adversely affect the environment.[78]Any person who contravenes the provisions of the Act is guilty of an offence.[79]

Harmful Waste (Special Criminal Provisions, Etc) Act[80]

The Harmful Waste (Special Criminal Provisions, etc) Act was promulgated in 1989 following the unfortunate incident of dumping of toxic hazardous waste at Koko Port in Delta State of Nigeria.[81] The Act prohibits dumping of harmful waste on any land, territorial waters, contiguous zone, exclusive economic zone or inland waterways of Nigeria.[82] Harmful waste is defined in the Act as any injurious, poisonous, toxic or noxious substance, nuclear waste, or radioactive substance of such quantity capable of subjecting a person to the risk of death, fatal injury or incurable impairment of physical or mental health.[83] Undoubtedly, renewable energy activities, especially biofuel production and use may precipitate toxic or noxious substances and it is the aim of the Act to ensure that such substances are not handled such as to expose the environment to risk. The Act provides for individual and corporate civil and penal sanctions for dumping of harmful waste in Nigeria.[84] The Act specifically criminalized dumping of harmful waste and prescribes the punishment of life imprisonment upon conviction.[85] An individual or body corporate is deemed to be liable under the Act if he or she actually does the act or omission prohibited under the Act, or aids, counsels or procures another to do so.[86] In addition to the penal sanction of life imprisonment, the individual may also be liable for damages in civil action.[87] Further, the carrier or land on which the harmful waste was dumped may as well be forfeited.[88] Under the Act, the Minister of Environment is vested with the powers to seal any area or site that is being used or may be used for dumping of harmful waste.[89] The Federal High Court of Nigeria has exclusive jurisdiction to try the offences specified in the Act.[90]

National Environmental Standards and Regulations Enforcement Agency (Establishment) Act[91]

The Act established NESREA charged with the responsibility of protection and enforcement of environmental standards in Nigeria.[92] The Act empowered NESREA to make regulations, specifications and standards on air and water quality, effluent limitations, control of harmful substances and other forms of environmental pollution and sanitation towards tackling environmental challenges in Nigeria.[93] This power extends to environmental issues arising from renewable energy development and use. The Act also criminalized violation of regulations made by NESREA. Any person who violates regulations made by NESREA, upon conviction, is liable to imprisonment for a term not less than one year or fine.[94] By sections 30 and 31 of the Act, an officer of NESREA armed with a warrant issued by a Court may at any reasonable time enter and search premises he believes have contravened environmental standards. Such search can be made without warrant where delay may pose threat to human life or the environment. The officer may also seize and detain any article by means of, or in relation to which he reasonably believes a contravention of environmental standards or legislation has been committed. A person who obstructs an officer of NESREA in performance of his duties commits an offence.[95] Curiously, one of the radical innovations introduced by the Act establishing NESREA is the authority given to NESREA to enforce compliance with the provisions of international agreements, protocols, treaties and conventions as may from time to time come into force.[96] Under the Nigerian law it is now settled beyond argument that an undomesticated international instrument ratified by Nigeria is a mere executive act which confers no legal right unless it is enacted into law by the Nigerian parliament pursuant to section 12(1) of the Constitution.[97] While section 12(1) of the Constitution expressly provides in plain terms that no treaty between the federation and any other country shall have the force of law except to the extent to which any such treaty has been enacted into law by the National Assembly, section 1(1) and (3) declares the

[77] *Ibid*, s. 4. Though the Act listed the above matters as the minimum content of an environmental impact assessment report, it is submitted that NESREA has the implied authority to request for additional information or study depending on the nature and location of the proposed project. See IKE Oraegbunam *et al*, 'A Critical Review of the Legal Regime for the Maintenance of Environmental Standards in Nigeria: Bio and Hydro Energy Sectors in Focus', (2019)7(3) *IJIDPS*, 92 – 104, 94.

[78] *Ibid*, s. 54.

[79] *Ibid*, s. 62. While the significant contribution made by the Environmental Impact Assessment Act in tackling environmental challenges in Nigeria is acknowledged, there is need to amend the Act to expressly include bioenergy projects and related activities that affect the environment on the mandatory study list contained in the Schedule to the Act.

[80] Cap. H1 *Laws of the Federation of Nigeria* 2004.

[81] CC Nwufo, 'Legal Framework for the Regulation of Waste in Nigeria', (2010) 4(2) *African Research Review*, 491 – 501, 492.

[82] Harmful Waste (Special Criminal Provisions, etc) Act, s. 1.

[83] *Ibid*, s. 15.

[84] *Ibid*, ss.1, 2, 3, 4, 5 & 7.

[85] *Ibid*, s. 6.

[86] *Ibid*, ss. 2 - 5.

[87] *Ibid*, s. 12.

[88] *Ibid*, s. 6.

[89] *Ibid*, s. 11.

[90] *Ibid*, s. 13.

[91] National Environmental Standards and Regulations Enforcement Agency (Establishment) Act No. 25 of 2007 (as amended 2018).

[92] *Ibid*, ss. 1, 2 & 7.

[93] *Ibid*, ss. 8, 20 – 27. By section 35 of the Act, every authorization, consent or thing done under the repealed Federal Environmental Protection Agency Act will continue to be in force and have effect as if made, issued, given or done under the corresponding provisions of the National Environmental Standards Enforcement Agency (Establishment) Act (as amended). Some of the Regulations that have been made under the Act include the National Environmental (Pollution Abatement in Mining and Processing of Coal, Ores and Industrial Minerals) Regulations, 2009; National Environmental (Sanitation and Wastes Control) Regulations, 2009; National Environmental (Pollution Abatement in Chemicals, Pharmaceuticals, Soaps and Detergent Manufacturing Industries) Regulations, 2009; etc.

[94] National Environmental Standards and Regulations Enforcement Agency (Establishment) Act No. 25 of 2007 (as amended 2018), s. 31.

[95] *Ibid.*

[96] *Ibid*, s. 7(c).

[97] 1999 Constitution of the Federal Republic of Nigeria (as amended 2018), s. 12; P Onyenweife, 'The Jurisdiction of the National Industrial Court of Nigeria over Domesticated Treaties Ratified by Nigeria: Another Look', (2012) 6(3) *Nigerian Journal of Labour and Industrial Relations*, 38 – 42, 40.

supremacy of the Constitution and the corresponding nullity of any law inconsistent with the Constitution.[98] The term 'any law' as used in section 1(3) of the Constitution was interpreted by the Supreme Court in the case of *Abacha v Fawehinmi*[99] to extend to treaties ratified by Nigeria. Section 12(1) of the Constitution reinforces the notion that Nigeria is a sovereign nation and as such foreign legislations and treaties do not have general application in Nigeria.[100] It is therefore manifest that no matter how beneficial to the country or its citizenry an international treaty to which Nigeria has become a signatory may be, it remains unenforceable if it is not enacted into law by the Nigerian legislature.[101] It follows that section 7(c) of the National Environmental Standards and Regulations Enforcement Agency (Establishment) Act (as amended) which gives NESREA authority to enforce undomesticated international instruments is an empty shell with no practical utility.

Nigeria Electricity Management Service Authority Act[102]

The Act established the Nigeria Electricity Management Service Authority (NEMSA), to carry out the functions of enforcement of technical standards, regulation, technical inspection, testing and certification of all categories of electrical installations, electricity meters and instruments etc; as well as to ensure the efficient production and delivery of safe, reliable and sustainable electric power supply.[103] This legislation therefore aims at guaranteeing safety of lives and property in relation to developments and activities in the Nigerian electricity industry, including developments and activities in the renewable energy subsector. The Act in Section 6 clearly enumerated the functions, objectives and responsibilities of NEMSA. One of the basic responsibilities of NEMSA is to specify safety requirements for construction, operation and maintenance of electrical power plants, transmission system, distribution network and electric lines.[104] Where it appears to NEMSA that there has been a breach or likely breach of environmental standards, regulations or the interest it is mandated to protect, NEMSA is empowered to notify the person or establishment in actual or potential breach of its intention to issue an enforcement order if the contravention is not remedied within a time scale.[105] Failure to comply with an enforcement order constitutes an offence.[106]

Electric Power Sector Reform Act[107]

This Act was enacted to establish the Nigeria Electricity Regulatory Commission (NERC), and to provide for the licensing and regulation of the generation, transmission, distribution and supply of electricity, amongst other related matters.[108] It repealed both the Electricity Act[109] and the National Electric Power Authority Act.[110] The Act established NERC[111] and mandates it, among others, to: (a) ensure the safety, security, reliability, and quality of services in the production and delivery of electricity; (b) establish or approve, as the case may be, appropriate operating codes for safety, security, reliability and quality standards for licensees in the electricity industry in Nigeria, including the renewable energy subsector thereof.[112] The NERC is entitled to conduct proceedings, consultations and hearings on matters within its jurisdiction and may make such recommendations, declarations, decisions, or orders as it deems fit.[113] The Act makes it an offence for any person to construct, own or operate an undertaking or in any way engage in the business of electricity generation (excluding captive generation), transmission, operation, distribution, or trading without a valid licence issued by the NERC.[114] Accordingly, the NERC is authorised to issue generation, transmission, system operation, distribution, and trading licences to qualified operators in the electricity industry.[115] The grant of a licence shall be subject to the restrictions set out in section 69, as well as any conditions as may be imposed by the NERC under section 71 of the Act. While issuing such licenses, NERC is expected by the Act to also impose such conditions that ensure that the physical environment is protected and there is no greater damage to streets or interference with traffic than is reasonably necessary.[116] The NERC also has powers to renew a licence upon expiration thereof, or to amend, cancel or enforce the terms contained in an existing licence.[117] NERC also has an obligation under the Act to develop standards, codes and manuals for licensees in the electricity industry and same is binding on the licensees.[118] In exercise of this power, NERC made the 2009 Grid Code for the Electricity Industry. The Grid Code stipulates the guidelines, standards and operating procedures for operators in the electricity industry in Nigeria. The regulation is designed to ensure that operators act within standards for public safety.[119] Contravention

[98] *Ibid*, p. 40.
[99] [2006]6 NWLR (pt. 660) 228 SC.
[100] P Onyenweife, *op. cit*.
[101] See *Abacha v Fawehinmi (supra)*; *Nnaji v NFA* [2010]11 NWLR (pt. 1206) 438; *MHWUN v Minister of Labour & Productivity* [2005]17 NWLR (pt. 953) 120.
[102] Nigeria Electricity Management Service Authority Act No. 6 of 2015.
[103] See the preamble to the Nigeria Electricity Management Service Authority Act.
[104] *Ibid*, s. 6(f).
[105] *Ibid*, s. 11(4).
[106] *Ibid*, s. 11(5).
[107] Electric Power Sector Reform Act No. 6 of 2005.
[108] See the preamble to the Electric Power Sector Reform Act. Also see HO Onyi-Ogelle, 'The Implications of Legal Reform in the Nigerian Power Sector', (2016) 10(3) *African Research Review*, 279 – 289, 279. Under s. 34 of the Act, the membership of the NERC shall consist of seven full time Commissioners to be appointed by the President from the public or private sector for their experience or professional qualifications in the following fields or areas of competence, *viz:* (a) generation, transmission, system operation, distribution or marketing of electricity; and (b) law, accountancy, economics, finance or administration.
[109] Cap. E7 *Laws of the Federation of Nigeria* 2004.
[110] Cap. N33 *Laws of the Federation of Nigeria* 2004.
[111] Electric Power Sector Reform Act, s. 31.
[112] *Ibid*, s. 32(1)(e) & (2)(b).
[113] *Ibid*, ss. 45 – 48. The Commission may even refer questions of law to the appropriate High Court before reaching a decision. See *ibid*, s. 49.
[114] *Ibid*, ss. 62(1) & 98. This rule does not include undertakings for generating electricity not exceeding 1 MW in aggregate at a site or an undertaking for distribution of electricity with a capacity not exceeding 100 KW in aggregate at a site, or such other capacity as the Commission may determine from time to time. See *ibid*, s. 62 (2).
[115] *Ibid*, ss. 64 – 68.
[116] *Ibid*, s. 77(7).
[117] *Ibid*, ss. 72 - 75.
[118] *Ibid*, ss. 81 & 96.
[119] See Preamble to the Grid Code.

of any provision of the Act or any regulations made pursuant to it is an offence.[120] NERC has powers to cancel a license on the ground of fraud, misrepresentation, contravention of the law or license obligations.[121] Where NERC is satisfied that a licensee is contravening, has contravened or is likely to contravene any of the conditions of a license, it may serve upon the licensee an order requiring him to mitigate or remedy the contravention.[122] However, before the order on the licensee, NERC must serve a notice upon the licensee concerned specifying the alleged or potential breach and urge the licensee to take steps to rectify same. In the order served on the licensee, NERC may impose penalty not exceeding ₦10,000 each day that the licensee is in default of compliance with the order.[123]

Energy Commission of Nigeria Act[124]
This Act was enacted to establish the Energy Commission of Nigeria (ECN) and to charge it with responsibility for coordination and general surveillance over the systematic development of the various energy resources of Nigeria, including renewable energy sources.[125] Accordingly, section 1 thereof establishes the ECN.[126] Pursuant to section 5, the ECN is generally charged with responsibility for the strategic planning and coordination of national policies in the field of energy, including bioenergy and hydroenergy. Thus, the ECN has the following duties: (a) serve as a centre for gathering and dissemination of information relating to national policy in the field of energy development; (b) serve as a centre for solving any inter-related technical problems that may arise in the implementation of any policy relating to the field of energy; (c) advise the Federal and State Governments on questions relating to such aspects of energy as may be referred to it; (d) prepare, after consultation with such agencies of government whose functions relate to the field of energy development or supply as the ECN considers appropriate, periodic master plans[127] for the balanced and coordinated development of energy in Nigeria; (e) lay down guidelines on the utilisation of energy types for specific purposes and in a prescribed sequence; (f) inquire into and advise the Federal and State Governments on the adequate funding of the energy sector; (g) collate, analyze and publish information relating to the field of energy from all sources; (h) monitor the performance of the energy sector in the execution of government policies on energy; (i) liaise with all international organisations in energy matters such as the International Atomic Energy Agency, World Energy Conference and other similar organisations; (j) promote training and manpower development in the energy sector; and (k) carry out such other activities as are conducive to the discharge of its functions.

Hydroelectric Power Producing Area Development Commission (Establishment, Etc) Act[128]
The Act establishes the Hydroelectric Power Producing Area Development Commission (HPPADC) as the entity charged with the responsibility of managing the ecological menace due to operation of dams and related matters.[129] The administrative body of HPPADC is its Governing Council which consists of a chairman, one person each from the states where hydroelectric power is generated, two persons representing non-hydroelectric power producing states, one person each from ministries of power, environment, water resources, finance and the Managing Director.[130] The functions and powers of HPPADC are set out in the part 2 of the Act and include: (a) carry out survey of hydroelectric power producing areas in order to ascertain measures which are necessary to promote the physical development of those areas; (b) prepare schemes designed to promote the physical developments of the hydroelectric power producing areas; and (c) tackle ecological problems that arise from overloading of dams in the hydroelectricity power producing areas and advise federal and state governments on the prevention and control of floods and environmental hazards.[131] Regrettably, HPPADC has no powers to enforce compliance with environmental standards in the event of contravention. It is advocated that the Act be amended to give HPPADC powers to enforce compliance with environmental standards in the hydropower sector.

Criminal Code Act[132]
The Criminal Code Act contains penal provisions for the protection of the environment from the adverse effects of human activities including renewable energy activities. Thus, the Criminal Code in section 245 states that any person who corrupts or fouls the water of any spring, stream, well, tank, reservoir or place so as to render it less fit for the purpose for which it is ordinarily used is guilty of an offence. Further, the Criminal Code in section 247 provides that any person who vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighbourhood or passing along a public way; or does any act which is, and which he knows or has reason to believe to be, likely to spread infection or any disease dangerous to life, whether human or animal; is guilty of an offence. The above criminal sanction applies where renewable energy activities are carried out in a manner that adversely affects air quality or results in the spread of diseases.

African Charter on Human and Peoples Rights (Ratification and Enforcement) Act[133]
This Act was made to domesticate the African Charter on Human and Peoples' Rights made in Banjul on the 19th day of January, 1981 and for purposes connected therewith. Thus, the Act prescribes that the provisions of the African Charter on Human and Peoples' Rights which are set out in the Schedule to the Act shall have the force of law in Nigeria and shall be given full recognition and effect and be

[120] Electric Power Sector Reform Act, s. 94(1).
[121] *Ibid*, s. 74.
[122] *Ibid*, s. 75.
[123] *Ibid*, s. 75 (4).
[124] Cap. E10 *Laws of the Federation of Nigeria* 2004.
[125] See the preamble to the Energy Commission of Nigeria Act.
[126]Membership of the ECN shall consist of the President, as chairman, and in the absence of the President, such other person as may be designated by him in that behalf to act as chairman and the following other members, that is: (a) the Ministers charged with responsibility for - (i) power and steel; (ii) petroleum resources; (iii) science and technology; (iv) defence; (v) agriculture and rural development; (vi) water resources; (vii) external affairs; (viii) finance; and (viv) the Director-General of the Commission who shall be the Secretary of the Commission. See *ibid*, s. 2.
[127]Such plans shall include - (i) recommendations for the exploitation of new sources of energy as and when considered necessary; and (ii) such other recommendations to the Federal Government relating to the ECN's as the ECN may consider to be in the national interest. See *ibid*, s. 5.
[128] Hydroelectric Power Producing Areas Development Commission (Establishment, etc) Act No. 7 of 2010 (as amended 2013).
[129] Preamble to the Hydroelectric Power Producing Areas Development Commission (Establishment, etc) Act.
[130] *Ibid*, s. 3 & 5.
[131]*Ibid*, s. 8(1).
[132] Cap. C38 *Laws of the Federation of Nigeria* 2004.
[133] African Charter on Human and Peoples Rights (Ratification and Enforcement) Act, Cap. A10 *Laws of the Federation of Nigeria* 2004.

applied by all authorities and persons exercising legislative, executive or judicial powers in Nigeria.[134] The said Charter provides, in article 24 thereof, that all peoples shall have the right to a general satisfactory environment favourable to their development. Clearly, this extends to the right to an environment, free from all adverse effects of renewable energy activities. Note that by virtue of the Fundamental Rights (Enforcement Procedure) Rules, the provisions of this Act are enforceable by way of an action for enforcement of fundamental rights, in the same manner as the provisions of Chapter IV of the Nigerian Constitution.[135]

International Law Framework on Renewable Energy

Soft Law Regime

Limited support for renewable energy is found at the international level, not least because of the absence of both binding and non-binding rules in international law on renewable energy.[136] There is no overarching branch of international law that directly deals with renewable energy.[137] What exists is a fragmented approach, where several weak international law instruments are co-opted in addressing issues on renewable energy.[138] Renewable energy promotion has, therefore, indirectly found support through soft law instruments, the international climate change regime, and activities of the International Renewable Energy Agency (IRENA). The 1972 United Nations Conference on the Human Environment was the first intergovernmental meeting devoted to environmental issues,[139] but it had little effect on the promotion of renewable energy. Renewable energy was specifically addressed, for the first time, in 1981 through the United Nations Conference on New and Renewable Sources of Energy.[140] Again, not much was achieved with this conference. The 1987 Brundtland report by the World Commission on Environment and Development was important because it considered renewable energy to be the 'foundation of the global energy structure during the 21st century.'[141] While the 1992 Rio Conference on Environment and Development popularized the concept of sustainable development and provided avenue for hard-law obligations like the climate change laws which will indirectly aid renewable energy, the Rio Declaration did not fully exploit the recognition given by the Brundtland Commission to renewable energy. Following this laxity, 'Agenda 21' concluded at the 1992 Rio Conference to guide future actions on the environment did not have a dedicated focus on energy, as renewable energy was only discussed in relation to protection of the atmosphere.[142] However, in the process which led to the 2002 World Summit on Sustainable Development, energy was identified as a major ingredient for fulfilling 'Agenda 21'.[143] To this end, the 'Water, Energy, Health, Agriculture and Biodiversity Working Group' (WE-HAB-WG) identified renewable energy as a major catalyst for achieving sustainable development.[144] However, this idea was not fully embraced by the Johannesburg Plan of Implementation, which merely discussed renewable energy in conjunction with energy efficiency as cross-cutting issues and discussed them in relation to unsustainable patterns of consumption and production.[145] This disappointing progress continued to the 2012 Rio +20 UN Conference on Sustainable Development where meaningful commitment on renewable energy was lacking.[146] To be fair, these soft law instruments, though non-binding, have raised awareness on the benefits of renewable energy. However, they have not fully explored the promotion of renewable energy in international law.

Climate Change Regime

The international climate change framework has an indirect effect on renewable energy. To this end, the United Nations Framework Convention on Climate Change (UNFCC) was adopted at the 1992 Rio Conference.[147] The Kyoto Protocol, adopted in 1997 under the UNFCC, set quantitative targets for industrialized nations to reduce their GHGs emissions.[148] The protocol made provisions for three flexibility mechanisms to enhance cooperation in the reduction of greenhouse gases. These mechanisms are the Joint Implementation, Clean Development Mechanism (CDM) and International Emission Trading.[149] While the Protocol does not stipulate the use of renewable energy as a mandatory tool for cutting down on GHGs, its flexibility mechanisms nevertheless aid the use of renewable energy.[150] For instance, the CDM sets the arena for industrialized nations to site sustainable projects in developing nations,[151] some of which projects are on renewable energy. However, it has been discovered that credits for Certified Emission Reductions were significantly higher for measures geared towards the capture of GHGs at source than for those which supported the use of renewable energy.[152] The Conference of Parties to the Kyoto Protocol met in Paris in 2015 and negotiated a climate change agreement.[153] The Paris

[134] *Ibid,* s. 1. Also see the Preamble to the Act.
[135]Fundamental Rights (Enforcement Procedure) Rules of 2009, Order 1 Rule 2 & Order 2 Rule 1; *Chief Gani Fawehinmi v Gen. Sani Abacha* [1996]9 NWLR (pt 475) 710.
[136] See M Citelli, *et al*, 'Renewable Energy in the International Arena: Legal Aspects and Co-operation', (2014) 2(1) *GroJIL*, p. 2.
[137]T Cottier, *et al*, 'Energy in WTO Law and Policy', available at <https://www.wto.org/english/res_e/publications_e/wtr10_forum_e/wtr10_7may10_e.pdf> accessed on 26th February 2023.
[138] *Ibid.*
[139] P Birnie, *et al*, *International Law and the Environment* (Oxford: Oxford University Press, 2009) p. 48.
[140]S Bruce, 'International Law and Renewable Energy: Facilitating Sustainable Energy for All?' (2013) 14(1) *Melbourne Journal of International Law*, p. 13.
[141] Report of the World Commission on Environment and Development: Our Common Future (Brundtland Report) Chapter 7, para. 88.
[142] United Nations Conference on Environment and Development, Agenda 21, Chapter 9, paras. 9:11 and 9:12(f).
[143] M Citelli, *et al, op. cit,* p. 3.
[144]WE-HAB-WG, 'A Framework for Action on Energy', available at <https://www.gdrc.org/sustdev/un-desd/wehab_energy.pdf> accessed on 14th May 2023.
[145]'Plan of Implementation of the World Summit on Sustainable Development', para. 20(c), available at <https://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf> accessed on 14th May 2023.
[146]CC Ogbumgbada, 'Developing an Effective Legal Framework for Renewable Energy Utilization in Nigeria', (2018) 8(3) *RELP*, 45 – 52, p. 47.
[147] P Birnie, *et al, op. cit,* p. 356.
[148] *Ibid,* p. 361.
[149] Kyoto Protocol to the UNFCC, Arts. 6, 12 & 17.
[150] M Citelli, *et al, op. cit,* pp. 25 – 26.
[151]M Manguiat, 'The Clean Development Mechanism and UNFCC/Kyoto Protocol Developments', in AJ Bradbrook, *The Law of Energy for Sustainable Development* (Cambridge: Cambridge University Press, 2005) p. 231.
[152] M Citelli, *et al, op. cit,* pp. 25 – 26.
[153] F Harvey, 'Paris Climate Change Agreement: The World's Greatest Diplomatic Success', *The Guardian*, 14th December 2015.

Agreement has been hailed as setting ambitious targets for tackling global warming.[154] Parties to the Agreement agreed to pursue efforts to limit global temperature increase to 1.5 degrees Celsius above pre-industrial levels.[155] While this agreement is more robust than the 2005 Copenhagen Accord and a significant improvement on the international climate change regime,[156] it however missed the golden opportunity to prioritize the widespread use of renewable energy.

International Renewable Energy Agency (IRENA)
The Statute of the International Renewable Energy Agency (IRENA) became the first international law instrument devoted to the promotion of renewable energy.[157] IRENA has the aim of promoting the widespread use of renewable energy in order to attain sustainable development. The agency has the capacity to unite the efforts of all institutional organisations whose works touch on renewable energy.[158] However, a significant weakness of IRENA is that it cannot issue legally binding renewable energy targets. Duplicating the activities of other similar bodies also pose another challenge to IRENA.[159] Other stumbling blocks include limited resources to pursue its programmes, portal proliferation syndrome, and its lack of strategic focus.[160] All these have the potential of weakening the efficacy of IRENA.

8. Obstacles to Renewable Energy Development in Nigeria
Presently, there are many obstacles inhibiting the development of renewable energy projects in Nigeria. Although, they presently appear to be obstacles, they could, in the long run, open up opportunities for long-term investment by both foreign and local investors.[161] The various obstacles observed by policy analysts, commentators and energy experts as constituting the clog in the wheel of progress in the development of the renewable energy projects include the following:

Policy and Regulatory Barriers
There is an absence of a clear institutional framework for renewable energy projects in Nigeria.[162] Also, there is an overlapping duplication of the roles and functions of the various regulatory bodies and institutions in charge of the power sector in Nigeria *viz*, Nigerian Electricity Regulatory Commission (NERC), Energy Commission of Nigeria (ECN) and Federal Ministry of Power. It appears from the regulatory perspective that these bodies share similar and often the same sphere of roles to play in the management and development of the renewable energy subsector in Nigeria. Absence of clearly distinct and separate roles amongst the regulators inevitably portends that the investors and active players in this industry would have to deal with a host of governmental institutions and agencies which will undoubtedly create ambiguity and misconception in the eyes of the investors.[163]

Financing and Investment Barriers
Renewable energy projects are very costly and capital-intensive. Such projects require and demand a huge capital outlay and financial resources for their effective implementation and execution. This therefore means that absence of a regular cash flow and consistent financing options for such investment projects constitute a barrier to the development of the renewable energy projects.[164]

Technological Barriers
Renewable energy requires up-to-date technologies which is capital in nature. Since such projects involve tapping energy from non-conventional and non-traditional sources, it therefore requires new and novel technologies which, in most instances, are not cheap and cost-effective. Further, the local competence and capacity to determine the right quality and standards for renewable energy in Nigeria is almost absent which has resulted in the poorly established standards for quality control of renewable energy technologies. The non-availability of these modern technologies in harnessing the huge potential of renewable energy in Nigeria has invariably constituted a clog in the wheel of the development of renewable energy projects in Nigeria.[165] This will continue to be so unless and until the appropriate steps are taken by the government.

Limited Public Awareness of the Potential of Renewable Energy and Electricity
Most Nigerians are still accustomed to the conventional energy sources and there is little or limited public knowledge about the huge inherent potentials of renewable energy projects in Nigeria. Inadequate awareness of the immense potential of this project has meant that there is little effort geared towards tapping its huge potentials. This lack of information and awareness creates a market gap that results in higher risk perception for potential renewable energy projects.[166]

Grid Access
Very few people have access to the National Grid. The rural areas or communities are totally not connected to the National Grid. As at today, not so many people have access to electricity and experience incessant power outages time and again. Statistics show that about

[154] See B Smith, 'Adapting the Paris Agreement', (2016) 4 *Georgetown Environmental Law Review Online,* p. 1.
[155] Paris Agreement, Art. 2(a).
[156] CC. Ogbumgbada, 'The Paris Agreement: An Imperfect but Progressive Document', (2016)8 *IELR,* pp. 320 323.
[157]PK Oniemola, 'International: The Statute of the International Renewable Energy Agency (IRENA): A Road Set for the Promotion of Renewable Energy' (2011)3 *IELR,* pp. 72 - 73.
[158] *Ibid,* p. 73.
[159]G Wright, 'The International Renewable Energy Agency: A Global Voice for the Renewable Energy Era?', (2011)2 *Renewable Energy Law and Policy Review,* pp. 251, 258 – 260.
[160] *Ibid,* pp. 258 – 264.
[161] OV Ojo, *op. cit,* p. 36.
[162]SO Oyedepo, 'Towards achieving Energy for Sustainable Development in Nigeria', (2014)34 *Renewable and Sustainable Energy Review,* pp. 255, 269.
[163] OV Ojo, *op. cit,* p. 37.
[164] *Ibid.*
[165] *Ibid,* p. 38.
[166] *Ibid.*

15.3m Nigerian households lack access to grid electricity, even those connected to the grid enjoy very unreliable electricity supply.[167] This almost negatively affected the development of the renewable energy subsector in Nigeria.[168]

Poor Legal Enforcement Mechanisms

The greatest problem of any legal system is the absence of a strong, viable and effective legal enforcement machinery. Ineffective enforcement and implementation is equal to non-existence of the legal regime. Interestingly and as it appears above, there exists a host of laws, rules, regulations, policies and master plans of renewable energy projects but this extensive legal regime will amount to a toothless bulldog if there is no effective legal enforcement machinery. In this sense, the poor legal enforcement by the existing regulatory bodies has inhibited the development of renewable energy projects in Nigeria and has almost made nonsense the existing legal framework.[169]

Infrastructural Barriers

There are also infrastructure problems to be addressed, such as poor power supply, impassable road networks and poor water supply. These are critical to the production, processing and distribution of both agricultural produce and other materials important to the success of the renewable energy programme in Nigeria.[170]

Uncertainty

A final obstacle to renewable energy development is source uncertainty. Many kinds of renewable energy depend on weather conditions, so that unpredictable weather can impact negatively on the consistency of the energy supply. For example, hydro-generators require sufficient rain to fill the dams for their supply of flowing water; wind turbines require wind to turn their blades; solar panels require clear skies and sunshine. If the weather is problematic, it will be hard for alternative energy systems to produce power as consistently as non-renewable sources.[171]

9. Conclusion

Though accepted by many commentators, experts and policy analysts as the viable alternative to the conventional energy sources in Nigeria, the reality as at today is that renewable energy sources, apart from hydropower, hardly feature as part of the Nigeria's energy mix, owing to an avalanche of challenges confronting the renewable energy subsector in Nigeria.[172] Such obstacles include duplication of regulatory roles, technological barriers, financing issues, inefficient legal enforcement mechanisms, etc. Towards surmounting these challenges, it is therefore recommended as follows:

(a) Nigeria should establish a single regulator with grandiose and categorical responsibility of overseeing the affairs of the renewable energy subsector rather than the current situation where many regulatory bodies have their different pie of regulatory roles with its attendant regulatory duplications.[173] Thus, redefining the legal and regulatory duties of the institutions may be desirable so that potential investors are not confused in any way.[174] This will also enhance the enforcement of the standards established under the legal framework for renewable energy in Nigeria.

(b) Financing is a huge clog to the progress of the renewable energy subsector in Nigeria and will continue to be unless appropriate and sustainable financing options are put in place. For this challenge to be successfully tackled and confronted, it will take a ready commitment from the government to leverage on the Public Private Partnerships (PPPs) for the financing of these projects across the energy value chain.[175]

(c) Both government and corporate entities have to seriously invest in the acquisition of the necessary technology and capacity building for renewable energy development. This will bridge the technology gap in the renewable energy subsector. Also, concerted efforts must be made to increase the level of public awareness regarding renewable energy potentials in Nigeria.

However and quite fortunately, the Nigerian Government has shown ready commitment by way of legal and regulatory reforms towards promoting renewable energy development in Nigeria. The above recommendations will go a long way to redress the issues confronting the existing legal and regulatory framework with a view to integrating renewable energy into the wider Nigerian energy value chain, enhancing energy efficiency and entrenching Nigeria as a renewable energy hub center in Africa.[176]

[167] '15.3m Nigeria Households Lack Access to Grid Electricity', *Premium Times*, 15th December 2012.
[168] OV Ojo, *op. cit*, p. 39.
[169] *Ibid.*
[170] OJ Olujobi and T Olusola-Olujobi, *op. cit*, p. 439.
[171] *Ibid.*
[172] PK Oniemola, 'Powering Nigeria through Renewable Electricity Investments: Legal Framework for Progressive Realisation', (2015)6 *Afe Babalola University Journal of Sustainable Development Law and Policy,* p. 84.
[173] EI Efurumibe, 'Barriers to the Development of Renewable Energy in Nigeria', (2013) 2(1) *Scholarly Journal of Biotechnology*, pp. 11 – 12.
[174] OV Ojo, *op. cit*, p. 37.
[175] *Ibid*, pp. 37 - 38.
[176] *Ibid*, pp. 26 – 27.