# Renewable Energy Regulatory Landscape; Towards a Sustainable Environmental Development in Nigeria

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## Abstract

*Despite being aware of the need to promote sustainable environmental development through renewable energy, Nigeria still grapples with enacting and implementing policies that will reduce environmentally damaging activities through the use of fossil fuels, which has increased Nigeria's global share of greenhouse gas emissions. Accordingly, this paper examines the global attitude to clean energy and further explores renewable energy sources, the existing regulatory enactments geared towards encouraging renewable energy, and challenges in Nigeria. Towards the end of it, this paper proposes a diversion of current energy subsidies on fossil fuels to renewables as well as a revamp of the existing legal framework in such a way that will accommodate both federal and state government participation in policymaking, promotion, and development of renewable energy in the country.*

## Introduction

Nigeria is one of the largest producers of oil in the world and the leading producer of petroleum in Africa as of 2021[3]. Oil revenues constitute 96% of the country's foreign exchange,[4] and statistics as of February 2021 show that Nigeria's Oil and Gas sector contributes to about 9% of the country's GDP[5].

Historically, oil was first discovered in commercial quantities in Oloibiri in the Ogbia Local Government Area of Bayelsa state, Nigeria, in 1956 by Shell-BP after it was previously discovered in non-commercial quantities in Akata, near Eket, a Local Government Area in

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[3]Statista (2022), leading oil producing countries in Africa as of 2021. https://www.statista.com/statistics/1178514/main-oil-producing-countries-in-africa/#:~:text=Nigeria%20was%20the%20leading%20oil,above%2050%20million%20metric%20tons. Accessed 5th of August 2022

[4]10 problems in the Oil and Gas Industry in Nigerian and possible solution**s**

https://infoguidenigeria.com/problems-nigeria-oil-and-gas-industry/ Accessed 5th of August 2022

[5] Statista, Contribution of oil and natural gas sector to GDP in Nigeria from the 4th quarter of 2018 to the 3rd quarter of 2021 https://www.statista.com/statistics/1165865/contribution-of-oil-sector-to-gdp-in-nigeria/ Accessed 5th of August 2022

Akwa Ibom, state of Nigeria in 1953.[6] Following the discovery, the exploration and continuous production of petroleum commenced in large quantities, leading to increased consumption of fossil fuels in the country. However, the combustion of petroleum products, especially in the transport and industrial sectors, contributed significantly to air pollution, water pollution, and the emission of greenhouse gases[7] (GHG). This consequently made Nigeria a contributor to greenhouse gas (GHG) emissions.[8] Interestingly, GHG in Nigeria reached a sum of 126.9 million tonnes in 2020, with the energy sector accounting for 60% of the total emission.[9] Owing to these, and many more factors, there has been a considerable amount of pressure on the federal government to diversify investment into renewable energy and technologies and to create a legal framework for the proliferation of the same.

## The Global Shift from Crude Oil

The global shift from oil started when the world experienced the damaging impacts of petroleum products on the environment. On the 4th of March 1989, the world witnessed one of the largest oil spills - The 'Valdez Oil Spill' when an ExxonMobil supertanker headed for Long Beach, California, spilled 11,000,000 gallons of crude oil into Alaska's Prince Williams Sound[10]. The spillage resulted in the extermination of native wildlife existing in the area.[11] At the time, this was the largest oil spill ever reported in United States history until the 'Deep Water Horizon Oil Spill' occurred on the 20th of April 2010, off the shore of the United States in the Gulf of Mexico. The spill released 314 million gallons of oil into the ocean, causing the death and deformities of marine species[12] in the area. Furthermore, the devastating environmental impacts caused over the years by oil operations and the burning of fossil fuels around the world, such as climate change, air pollution, water pollution, and

[6] Frynas, J. G. (1999). *Oil in Nigeria: Conflict and Litigation Between Oil Companies and Village Communities*. Münster: Lit Verlag.

[7] The Greenhouse gases are Carbon dioxide ($CO_2$), Methane ($CH_4$)Nitrous oxide ($N_2O$)Industrial gases: Hydrofluorocarbons (HFCs) Perfluorocarbons (PFCs) Sulfur hexafluoride ($SF_6$) Nitrogen trifluoride ($NF_3$).

[8] Oniemola, P.K. (2015). *Powering Nigeria through Renewable Electricity Investments: Legal Framework for Progressive Realization*. Journal of Sustainable Development Law and Policy,pg 6, 84.< https://doi.org/10.4314/jsdlp.v6i1.4

[9] H. Ritchie, M. Roser & P. Rosado (2020) - "*$CO_2$ and Greenhouse Gas Emissions*". *Published online at OurWorldInData.org.* Retrieved from: <https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions> Accessed, August 13, 2022.

[10] This means all State and Federal waters within the Prince William Sound including the approach to Hinchinbrook Entrance out to and encompassing Seal Rock. https://www.law.cornell.edu/definitions/index.php?width=840&height=800&iframe=true&def_id=a3a106ffb43abe89891021fecd0e49f1&term_occur=999&term_src=Title:33:Chapter:I:Subchapter:O:Part:155:Subpart:E:155.1130#:~:text=Prince%20William%20Sound%20means%20all,to%20and%20encompassing%20Seal%20Rock. Accessed 6th of August, 2022.

[11] Exxon Valdez Oil Spill (2018) https://www.history.com/topics/1980s/exxon-valdez-oil-spill) Accessed 10th of August 2022

[12] Deep Water Horizon Oil Spill in the Gulf of Mexico https://www.mmc.gov/priority-topics/offshore-energy-development-and-marine-mammals/gulf-of-mexico-deepwater-horizon-oil-spill-and-marine-mammals/ Accessed 6th of August 2022.

many more, have spurred the countries of the world to make considerable efforts towards transitioning their respective territories into renewable energy-based economies. In Nigeria, oil spillage, gas flaring in the Niger-Delta region, oil shock[13], and many more factors have motivated the government to create a framework to transition to alternative energy sources properly.

## Global attitude towards Renewable Energy

The harmful environmental impacts caused by the use of fossil fuels propelled the countries of the world towards formulating and implementing policies and laws to achieve zero use of non-renewable forms of energy. In September 2015, 193 countries, including Nigeria, established and adopted the United Nations (UN) 17 Sustainable Development Goals of the 2030 agenda for sustainable development. The UN SDG goals, which came into force on the 1st of January 2016,[14] are aimed at ensuring that all countries of the world make concerted efforts to end poverty, fight inequality and tackle climate change; specifically, Goal 7 and 13 are aimed to tackle climate change by ensuring affordable, reliable, clean and sustainable energy and combat climate change by 2030.

To ensure proper implementation of the 7th Goal, the United Nations defined the five targets of the Goal and the indicators to track the targets to see whether they have been achieved[15]. The targets set by the United Nations are as follows:

1. Ensure universal access to modern energy,
2. Increase the global percentage of renewable energy,
3. Double the improvement in energy efficiency to promote access to research,
4. Technology and investments in clean energy
5. Expand and upgrade energy services for developing countries.

Prior to the adoption of the UN SDG Goals, developed countries of the world had approved what became the foremost and pivotal treaties on Climate change-The Kyoto Protocol. The Protocol was ratified on the 11th of December 1997 but, it came into force eight years later on February 16th 2005, due to some complications in its approval procedure.[16] At the time

[13] A sudden rise in the price of oil that is most times accompanied by a decrease in oil supply. Nigeria experienced an oil windfall during the oil crisis of the 1970s, brought about by shortage of oil supply worldwide. This oil windfall led to soaring prices of goods and services and energy products.
[14]"The Sustainable Development Agenda" https://www.un.org/sustainabledevelopment/development-agenda-retired/#:~:text=On%201%20January%202016%2C%20the,Summit%20%E2%80%94%20officially%20came%20into%20force. Accessed 3rd of August 2022
[15] Ritchie, Roser, Mispy, Ortiz-Ospina (2018) "Measuring progress towards the Sustainable Development Goals." (SDG 7) *SDG-Tracker.org, website*
[16] What is Kyoto Protocol? https://unfccc.int/kyoto_protocol, Accessed 7th of August 2022.

of its endorsement, only a few countries were signatories to it, but its membership grew to 192 countries some couple of years later. [17] The Protocol, which operates based on the United Nations Framework Convention on Climate Change (UNFCCC) binds industrialized (developed) nations of the world to limit and cut down the emission of Green House Gases (GHG) to the barest minimum[18]. The goal of the Kyoto protocol is to cut down the emission of Green Houses Gases in line with the agreed individual targets of member countries.[19] In a bid to ensure that member nations strive towards the reduction of the emission GHG, the protocol spread the targets over 2 commitment periods[20]. The first commitment period of the Protocol is aimed to cut down emission of GHG by 5% compared to the 1990 levels over five years (2008- 2012), and the second commitment period, which gave birth to the Doha amendment, aimed to cut down emission to 18% over eight years (2012-2020).[21]

Surprisingly, Nigeria happens to be one of the last nations to ratify the Protocol, in fact, it became the 144th country to adopt the Kyoto protocol by ratifying the Doha amendment to the Protocol on October 2, 2020.[22] In a statement corroborating the said development, the Minister for Environment, Dr Mohammed Mahmood Abubakar, stated: "Our country ratified the Doha amendment to the Kyoto Protocol on Friday, October 2, 2020. The amendment started in 1997 when 192 countries in the conference of parties, under the UN's climate change framework on the convention on climate change, agreed to the Protocol,"[23]. Subsequently, in December 2015, 195 countries approved the Paris Agreement, which significantly which came as a major improvement to the Kyoto protocol gladly, Nigeria was a signatory. The Agreement sought to cover developed and developing nations and create a pathway for developed nations of the world to assist developing nations in their climate change alleviation and adaptation efforts[24]. The treaty set long-term goals to guide nations of the world in their quest for the reduction of hydrocarbon emissions, as follows:[25]

1. Substantially reduce global greenhouse gas emissions to limit the global temperature increase in this century to 2 degrees Celsius, while pursuing efforts to limit the increase even further to 1.5 degrees;

[17] Ibid.
[18] Ibid
[19] Ibid
[20] Ibid
[21] Ibid
[22] Saxone Akhaine, Kaduna"Nigeria endorses the Kyoto Protocol on Climate Change" https://guardian.ng/news/nigeria-endorses-kyoto-protocol-on-climate-change/ Accessed 7th of August 2022
[23] Ibid
[24] The Paris Agreement, https://www.un.org/en/climatechange/paris-agreement Accessed 8th of August 2022
[25]Ibid

2. Review countries' commitments every five years
3. Provide financing to developing countries to mitigate climate change, strengthen resilience and enhance abilities to adapt to climate impacts.

This pivotal agreement marked the turning point of global efforts to combat climate change as organizations, states, and stakeholders in the oil and gas sector endeavored to ensure compliance with the treaty and meet it set targets. Consequently, as nations of the world strived to stick to the commitments they made to the pact, there were corresponding shifts in investment trends in renewable energy space.

## Global Investment Trends in the Renewable Energy sector.

Clean Energy Investment grew steadily but slowly per year after five years of signing the Paris Agreement. However, since 2020 its growth has accelerated to about 12%.[26] For instance, global investment in the Energy sector skyrocketed to $755 billion in 2021, the highest amount ever recorded.[27] During this period, renewable energy experienced a record investment of $366 billion, which was an improvement of 6.5% from the previous year[28]. Electrified transport, which includes expenses on electric vehicles and associated infrastructure, was the second most invested industry in the Energy sector, with an investment of about $273 billion.[29] Other investment areas include storage of energy, electrified transport, electrified heat, nuclear hydrogen, and sustainable materials.[30]
Summarily, clean power and electrification (comprising renewables, nuclear, energy storage, electrified transport, and electrified heat) accounted for the vast majority of the $731 billion investment, while hydrogen, carbon capture and storage and sustainable materials made up the rest, reaching the sum of $24 billion.[31] All of these were made possible as a result of financial support given by governments of developed countries and sustainable finance, especially from advanced countries of the world.

Regionally, transition investment to renewable energy also burgeoned, with the highest investments being made in Asia Pacific Countries (APAC). The APAC invested $368 billion and recorded a 36% growth in its investment transition project; [32] the European Middle East & African countries (EMEAC) invested $268 billion, which saw their transition investment grow

[26] Record clean energy spending is set to help global energy investment grow by 8% in 2022 https://www.iea.org/news/record-clean-energy-spending-is-set-to-help-global-energy-investment-grow-by-8-in-2022 Accessed 9th of August 2022
[27] Global Investment in low-carbon energy transition hits $755 billion in 2021 https://about.bnef.com/blog/global-investment-in-low-carbon-energy-transition-hit-755-billion-in-2021/ Accessed 9th of August 2022
[28] Ibid
[29] Ibid
[30] Ibid
[31] Ibid
[32] Ibid

by 16%;[33] the Americas (AMER) transition investment grew by 21% by making a $150billion investment.[34] On a country basis, China has been the largest investor in Renewable energy by single-handedly investing the sum of $266 million,[35] followed by the United States with $114 billion, the E.U as a bloc with $154 billion[36] and Germany, the United Kingdom, and France coming 3rd, 4th and 5th place as of 2021[37] respectively.

Investment in sustainable energy has been relatively low in Africa. However, the International Renewable Energy Agency (IREA) projects that Africa could meet 67% of its energy needs from renewable energy with the right policies, regulatory framework, and access to sustainable finance.[38]

For instance, countries like Egypt, Ethiopia, Kenya, Morocco, and South Africa have been said to show commitment towards the use of clean energy while smaller countries like Djibouti, Rwanda Cape Verde, and Swaziland have created ambitious targets[39]. For example, Egypt, Kenya, South Africa, Namibia, and Ghana have been responsible for 1.8W of new solar installations on the continent.[40] Also, more than one-third of Morocco's electricity is almost entirely renewable[41].

In Nigeria, on the other hand, investment in renewable energy is unfortunately quite low due to the absence of an adequate framework to aid sustainable energy development. However, there seem to be chances of growth for the renewable energy sector in the country. To give an example, in December 2019, a private company, Rensource Energy, was able to garner $20 million in an equity financing round.[42] Also, Nigerian Power startup -Anergy Solar was able to raise $9 million for its expansion and has supplied over 2MW of installed capacity and over 5 MWh of storage capacity to business and residential clients across the country.[43] The Federal Government projects to invest $3 billion in the energy sector and to end electricity subsidies by December 2021.[44] Recently, energy giant, Total

[33] Ibid
[34] Ibid
[35] Ibid
[36] Ibid
[37] Ibid
[38] Obonyo R., Push for renewables: How Africa is building a different energy pathway, Africa Renewal (2021)https://www.un.org/africarenewal/magazine/january-2021/push-renewables-how-africa-building-different-energy-pathway. Accessed 9th of August 2022.
[39] Ibid
[40] Ibid
[41] Ibid
[42] Oluwatosin Adeshokan "Nigeria attracts $29m in green equity finance" https://www.theafricareport.com/21981/nigeria-attracts-29m-in-green-equity-finance/ Accessed 9th of August 2022
[43]Ibid
[44] By Nomvuyo Tena (2021) Nigeria: "Federal Government to spend $3b in power sector" https://www.esi-africa.com/industry-sectors/finance-and-policy/nigeria-federal-government-to-spend-3b-in-power-sector/ Accessed 9th of August 2022

Energies decided to invest $60 billion in the Energy sector, in which a portion of the investment would go to renewables.[45] Despite the laudable efforts and investments being made towards renewable resource development in Nigeria, they are minute when compared to that being made in other parts of the world. There is need for the country to triple its investments in the clean energy sub-sector in order for it to transition to a green energy based economy.

## Renewable Energy Sources in Nigeria

The National Renewable Energy and Energy Efficiency Policy (NREEEP) defines renewable energy as energy obtained from energy sources whose utilization does not result in the depletion of the earth's resources. Accordingly, what qualifies any form of energy as clean, rather than merely being in a renewable form, is its carbon intensity or content after being processed.[46] In a nutshell, renewable energy reduces the impact of greenhouse emissions on the environment.

Nigeria is an energy resource-rich country endowed with an abundance of renewable energy resources, providing her with a great capacity to develop an effective national energy plan[47]. However, Nigeria has only been able to over the years successfully generate power from hydropower and biomass sources, with wind and solar energy sources only generating power in minute amounts.[48] The country has six geopolitical zones which have the potential to generate energy from the natural deposits available therein. Sadly, Nigeria is yet to exploit these vast available energy potentials that have less environmental and climatic impacts. Nigeria's most common renewable energy sources are wind, solar, hydrothermal, geothermal and, more recently, hydrogen. Therefore, it is necessary to examine these sources of energy and their availability in the regions of the country hereunder:

1. Wind: Literally, wind energy is the energy generated from the wind. Technically, wind

[45]By Nomvuyo Tena (2021) TotalEnergies to invest $60 billion into renewable project in Nigeria https://www.esi-africa.com/industry-sectors/future-energy/totalenergies-to-invest-60-billion-into-renewable-project-in-nigeria/ Accessed 9th of August 2022

[46] Maureen, N. (2019.). Legal Framework On Clean And Renewable Energy Towards Sustainable Environment In Nigeria. *Nnamdi Azikiwe University Journal of International Law and Jurisprudence, (NAUJILJ), 10(1), 79–90.*

[47] Vincent-Akpu, I. (2012). Renewable energy potentials in Nigeria. *Energy Future The Role of Impact Assessment 32*. Vincent-Akpu, I. (2012). Renewable energy potentials in Nigeria. *Energy Future The Role of Impact Assessment 32*. <https://conferences.iaia.org/2012/pdf/uploadpapers/Final%20papers%20review%20process/Vincent-Akpu,%20Ijeoma.%20%20Renewable%20energy%20potentials%20in%20Nigeria.pdf> Accessed August 2, 2022.

[48] Shaaban, Mohamed; Petinrin, J. O. (1 January 2014). "Renewable energy potentials in Nigeria: Meeting rural energy needs". *Renewable and Sustainable Energy Reviews*. **29**: 72–84. doi:10.1016/j.rser.2013.08.078. ISSN 1364-0321.

energy is a form of solar energy brought about by a combination of three concurrent events; the sun unevenly heating the atmosphere, irregularity of the earth's surface, and the earth's rotation.[49] Hence, wind energy is a renewable energy source because nature constantly produces it, and its usage does not affect its availability. To generate electricity, most users of this form of energy use wind turbines because of the aerodynamic force generated from the rotor blades. Wind energy produces electricity by using the Kinetic energy of motional air[50]. The wind falls on the turbine's blades, which causes the blades to rotate and turn the turbine joined to them[51]. This transforms the Kinetic energy into rotational energy, causing the shaft connected to the generator to move, thereby producing electricity via the process of electromagnetism[52]. Wind turbines do not emit carbon, and consequently, no greenhouse gases are produced. Interestingly, wind energy is gradually becoming one of the fastest-growing sources of renewable energy, and its usage is rising partially because of the falling cost of generating it[53]. Between 2009 and 2013, the production of wind energy doubled and in 2016 wind energy was responsible for contributing 16% of the electricity generated by renewables[54].

In Nigeria, the availability and use of wind energy depend on location due to the varying topography and roughness of the country and the season. According to research by the Nigerian Metrological Agency, wind speeds are generally weak in the south except for the coastal regions and offshore, which are windy. Hence, the adoption of this source of energy in Nigeria depends on geographical location. Wind speed in Nigeria ranges from 2m/s to 4m/s and the highest average wind speed was 3.5 m/s and 4.5 m/s in the south and North respectively as at 1994[55]. As of 2010 the annual average wind speed in Nigeria was predicted to be about 4m/s.[56] Current reports place annual mean wind speed at 2-9.5 m/s and the annual power density range between 3.40 and 520 kW/m2 in Nigeria.[57]

[49] How Do Wind Turbines Work? *Office of Energy Efficiency and Renewable Energy*. <https://www.energy.gov/eere/wind/how-do-wind-turbines-work> Accessed August 5, 2022.

[50] Wind energy https://www.irena.org/wind Accessed 24th of August 2022
[51] Ibid
[52] Ibid
[53] Ibid
[54] Ibid
[55] Oyewole J.A ARO TO " Wind Speed Pattern in Nigeria (A Case Study of Some Coastal and Inland Areas)https://www.ajol.info/index.php/jasem/article/view/166347/155785"
[56] ibid.
[57] M.S Daramola , O.M Oyewola " Wind speed pattern and energy potential in Nigeria" https://www.sciencedirect.com/science/article/abs/pii/S0301421511000929?via%3Dihub Accessed 24th of August 2022.

2. Solar: Solar energy is the energy derived from the sun. The energy generates light and heat. Usually, solar technologies convert sunlight into electrical energy through photovoltaic (PV) panels or mirrors that concentrate solar radiation, which can be used to generate electricity or be stored in batteries or thermal.[58] Solar energy is suitable for use in Nigeria due to its geographical location. The country is geographically situated in the equatorial region, which is known to have an abundant solar energy supply. Consequently, Nigeria may optimize solar for electrical power generation at full capacity. The Northern region has the potential for Solar Energy, with temperatures reaching 40c (104F) during the day and during the early part of the year[59]. The North itself has average solar insolation of 2200KWh/M^2[60] while the Southern part has 1800kWh/M^2[61]. Recently, solar energy's contribution to electricity in Nigeria witnessed considerable growth between 2012 and 2020. In 2012 solar energy contributed 22.45 GWH to electricity generation in Nigeria[62]. In 2013 the power generated from it rose from 22.75GWH to 23.04 GWH, and in 2015 it steadily grew from 25.11GWH to 27.18 GWh in 2016[63]. It burgeoned quickly from 27.95 GWH in 2017 to 28.19 GWh in 2018 and increased tremendously to 41.30 GWh in 2019[64]. It then rose minutely to 41.99GWH in 2020[65].

3. Geothermal: The word geothermal emanated from the greek words geo (earth) and therme (heat). Geothermal energy is the energy derived from the heat below the earth. Essentially, the energy comes from the radioactive decay of minerals within the earth's core and solar energy absorbed into the surface. Consequently, geothermal energy is referred to as renewable because the earth continuously produces heat, and no surface combustion is involved, which makes the energy clean. Therefore, this form of energy can be used to generate electricity for domestic use.

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[58] How Does Solar Work? *Office of Energy Efficiency and Renewable Energy*. <https://www.energy.gov/eere/solar/how-does-solar-work#:~:text=Solar%20technologies%20convert%20sunlight%20into,in%20batteries%20or%20thermal%20storage.> Accessed August 5, 2022.

[59] Climate- Nigeria "Average weather, temperature, rainfall, when to go, what to pack" Accessed 24th of August, 2022 https://www.climatestotravel.com/climate/nigeria Accessed 25th of August 2022

[60] [1] Solar irradiance is the output of light energy from the entire disk of the Sun, measured at the Earth. **https://www.nasa.gov/mission_pages/sdo/science/Solar%20Irradiance.html** Accessed 25th of August 2022

[61] Renewable Energy in Nigeria , https://www.africa-eu-renewables.org/ Accessed 25th of August 2022

[62] Solar Energy Data, Electricity Generation Trends https://www.irena.org/solar Accessed 24th of August, 2022

[63] Ibid

[64] Ibid

[65] Ibid

4. Hydrogen: Hydrogen is conceivably the least explored source of renewable energy in the world. However, hydrogen is the most abundant element in the universe and can be produced from many sources. Despite its simplicity and abundance, hydrogen does not occur naturally as a gas on the earth. It is always combined with other elements. For example, water is a product of hydrogen and oxygen.[66] Interestingly, hydrogen is light and has good safety records during storage, transportation, and utilization.

5. Hydro-Power:_Hydro-power is the oldest renewable energy resource that uses the energy of fast-moving water channeled through a water turbine to generate electric power.[67] Presently, hydro is the second-largest energy resource for electricity generation in the country, contributing about 32% of the total installed grid-connected electricity generating capacity.[68]In 2011 the amount of power generated from this source of energy increased from 5,227GWH to 5,309 GWh in 2012[69]. In 2013, it rose from 6,122GWH to 6,144 GWh in 2014, then grew sharply to 6,423GWH in 2015[70]. The subsequent year witnessed a tremendous leap from 6,423GWH to 8,150 GWH, then it reduced to 7,747 GWh in 2017[71]. In 2018, it burgeoned from 7,695 GWH to 8,433 GWh in 2019 and fell to 8,229 GWH in 2020.[72] Generally, hydropower is the most flexible source of power generation available. It is capable of responding to demand fluctuations in minutes, delivering base-load power, and storing electricity over weeks, months, seasons, or even years when a reservoir is present.[73] Aside from the high initial capital cost of setting it up, hydropower provides the cheapest and cleanest source of electricity. Thankfully, Nigeria is endowed with large rivers and a few natural falls such as River Niger, River Benue, and Lake Chad, which are together responsible for the high hydropower potential of the country. Nigeria's large-scale operational hydroelectric power facilities are; the

[66] Hydrogen & Fuel cells. *Renewable Energy World*., <https://www.renewableenergyworld.com/types-of-renewable-energy/hydrogen/#gref> Retrieved 9 August 2022.
[67] Aderoju, O., Dias, G., & Echakraoui, Z. (2017). *Assessment of Renewable Energy Sources & Municipal Solid Waste for Sustainable Power Generation in Nigeria*. *95*. <https://iopscience.iop.org/article/10.1088/1755-1315/95/4/042043/pdf> Accessed August 9, 2022.
[68] NATIONAL ENERGY POLICY, 3 (2003). <http://rea.gov.ng/wp-content/uploads/2017/09/National_Energy_Policy_Nigeria.pdf> Accessed August 12,2022.
[69] Hydro power Data, Energy trends in Nigeria https://www.irena.org/hydropower Accessed 24th of August 2022
[70] Ibid
[71] Ibid
[72] Ibid
[73] Intergovernmental Panel on Climate Change (IPCC), "Special Report Renewable Energy Sources and Climate Change Mitigation," Working Group III-Mitigation of Climate Change, IPCC, 2011. Hydropower

Kanji dam, Jebba dam, and Shiroro dam. Hydropower is undoubtedly the major contributor to electricity generation in Nigeria. The installed Hydropower capacity in Nigeria totals 12,522 Megawatts[74], excluding power generated off-grid generation of hydropower. The total exploitable energy in the country has been estimated to be 14120 MV which is tantamount to, 50800GW[75]. The country has also recently collaborated with China to build the largest hydropower plant - the Mambilla Hydropower plant.

6. Biomass: Biomass is a form of renewable energy derivable from organic waste materials. It can be obtained from household or agricultural waste from animals and crops. Biofuel is a potential source of alternative energy in Nigeria and has been recognized as a sustainable form of renewable energy with sugarcane, cassava, plant seed and waste materials being possible feedstock for bioethanol and biodiesel production[76]. Typically, biomass contains energy first derived from the sun, then plants absorb the sun's energy through a process known as photosynthesis and convert carbon dioxide and water into nutrients. Interestingly, biomass contains a high percentage of hydrogen, which can be chemically extracted and used to generate power and fuel vehicles. [77] Biomass energy has been a major contributor to electricity generation in Nigeria. In 2012 and 2013, the amount of electricity generated from biomass stood at 15.40GWH[78]. This steadily rose from 18.9GWH in 2014 to 22.40GWH in 2015, then it reached it peak in 2016 at 25.30GWH, after which it fell drastically to 21.96GWH in 2017[79]**.** It fell a little further to 20.96GWH in 2018 **,** and remained so up till 2020[80]. Most states in the country are endowed with fertile land and good climate to grow agricultural products which can later be used to produce

[74] Nigeria Power Africa Fact Sheet, https://www.usaid.gov/powerafrica/nigeria
[75] International Hydropower Association https://www.hydropower.org/country-profiles/nigeria#:~:text=6.10%20TWh%20(2019)-,Nigeria%20is%20bestowed%20with%20large%20rivers%20and%20natural%20falls.,well%20as%20Lake%20Chad%20basin.&text=The%20total%20exploitable%20potential%20of,50%2C800%20GWh%20of%20electricity%20annually.
[76] Adewale Adewuyi " Challenges and prospects of renewable energy in Nigeria: A case of bioethanol and biodiesel production" https://www.sciencedirect.com/science/article/pii/S2352484719313137#:~:text=Interestingly%2C%20Nigeria%20is%20endowed%20with,utilization%20are%20the%20most%20abundant. Accessed 18th of August 2022.
[77] Biomass Energy. (n.d.). *National Geographic*., <https://education.nationalgeographic.org/resource/biomass-energy> Retrieved 8 August 2022
[78] Bioenergy Data, Electricity Generation trends https://www.irena.org/bioenergy Accessed 24th of August 2020
[79] Ibid
[80] Ibid

biofuel (Bioethanol, Biodiesel). However, the production of this type of renewable energy is still being hampered by lack of access to land to cultivate feedstock, high cost of production, and lack of adequately framed government policies.

7. Ocean Energy **:** This is a type of energy that uses tides, waves and current to produce electricity. Ocean energy is still in its research and developmental stages. However, it could prove to be a wonderful source of renewable energy in Nigeria, since the country has lots of beaches, oceans, and connected water bodies.

## Transition efforts towards renewable energy in Nigeria

It has been established that Nigeria is blessed with various forms of renewable energy, hence it is imperative to make policies, plans, and legislations to harness, exploit and develop these forms of energy. The Nigerian government have been making efforts to fully transition to a renewable based economy since the country signed the two essential treaties on reduction of carbon emission -Kyoto Protocol and Paris Agreement.

In 2005 the Nigerian government commissioned the Renewable Energy Master Plan (REMP) which sought to suggest ideas for renewable energy and technologies that can be used in achieving substantial development of renewable energy[81]. Also, in February 2018, the United States Agency for International Development (USAID) together with Power Africa and with support of the Nigerian government, concluded the four-year Renewable Energy and Energy Efficiency Project (REEEP) in Nigeria which was able to provide 261,938 people with clean and renewable energy across the country. The project was stated to have prevented up to 4.5 million metric tons of carbon dioxide from polluting the atmosphere[82].

Furthermore, the Nigerian Government has commenced plans to build $5.8 billion hydropower plant near eastern Mambilla area after concluding plans to obtain loan from China's Export -Import Bank[83]. The Chinese lenders are to provide 85% of the total 5.8 billion dollar project and Nigerian government will provide the rest of the funding[84]. The Mambilla

[81] Aliyu, Abubakar Kabir; Modu, Babangida; Tan, Chee Wei (January 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. doi:10.1016/j.rser.2017.06.055. ISSN 1364-0321. Accessed 18th of August

[82] Balabalwa Bungane (2018) "USAID completes renewable energy project in Nigeria" https://www.esi-africa.com/industry-sectors/energy-efficiency/usaid-completes-renewable-energy-project-nigeria/ Accessed 18th of August 2022

[83] By Sophie Mongalvy, David Malingha, and Anthony Suagzzin "Nigeria to Start Building $5.8 Billion Power Plant in 2018" https://www.bloomberg.com/news/articles/2018-01-30/nigeria-to-start-building-5-8-billion-hydro-power-plant-in-2018#xj4y7vzkg Accessed 22nd of August 2022

[84] Ibid

project is considered to be the largest project ever on energy to be embarked on by the Nigerian government. The 3,050-megawatt power plant is projected to take five years to build, and it will create four dams that measure about 50 meters in width and 150 meters in height[85].

Also in 2018, the federal government set up the Nigerian Electrification Project (NEP) with the World Bank, African Development Bank (AFDB), and other partners to provide energy services to underserved and unserved communities[86]. The scheme, which is a purely private sector-driven initiative sector executed by the Rural Electrification Agency (REA) promotes electricity access to households, micro, small, and medium enterprises (MSMEs), and public education institutions[87]. It aims to provide cost-effective power to 250,000 MSMEs and 1 million households through off-grid and mini-grid systems by 2023 [88]via Solar Hybrid Mini-grids, Standalone Solar System (SHS), Technical Assistance, and Energizing Education Program.

The private sector has also contributed it own quota to the transition efforts to renewable energy. To give an example, Nigerian Power startup -Anergy Solar was able to raise $9 million for its expansion and has gone ahead to supply over 2MW of installed capacity and over 5 MWh of storage capacity to business and residential clients across Nigeria[89]. In addition, energy giant, Total Energies has decided to invest $60 billion in the Energy sector, in which a portion of the investment would go to renewables[90]

## Existing Policies and Regulatory Framework in Support of Renewable Energy in Nigeria

Although Nigeria is blessed with natural resources, it is yet to explore its potential to improve its energy supply by adopting green energy, which reduces greenhouse emissions and enhances sustainable development. A quick glance on the existing regulation on energy would. Sadly, a glance at the existing regulation on energy in Nigeria would indicate that most regulatory frameworks are made for non-renewable energy with minimal reference to renewable energy sources. Undoubtedly, the development of a nation is largely hinged on its ability to make proactive and firm regulatory frameworks and policies. Hence, this section

[85] Ibid
[86] By Chigozie Nweke -Eze "AN UPDATE ON NIGERIAN ELECTRIFICATION PROJECT: ELECTRIFYING NIGERIA'S MOST UNDERSERVED" https://www.energyforgrowth.org/memo/an-update-on-the-nigerian-electrification-project-electrifying-nigerias-most-underserved/ Accessed 26th of August 2022
[87] Ibid
[88] Ibid
[89] Ibid at note 42
[90] Ibid at note 43

aims to examine the existing legal framework for the promoting the adoption of green energy in Nigeria. The following are some policies and regulatory frameworks that encourage the adoption of renewable energy.

1. Environmental Impact Assessment Act 1992: This Act mandates any person, authority, corporate body, or unincorporated body seeking to undertake any projects or activities in the country to consider the impact of such actions on the environment by undergoing an Environmental Impact Assessment. The assessment report must be submitted to the National Environmental Standards and Regulations Enforcement Agency (NESREA). Illustratively, a power developer who wishes to generate power through renewable energy must submit an EIA report to the NESREA.[91].

2. National Energy Policy 2003: This Policy provides for both fossil fuels and renewable energy. It aims to guarantee an adequate, reliable and sustainable supply of energy at reasonable costs and in an environmentally friendly manner, to the various sectors of the economy, for national development.[92] The Policy referred to various renewable energy sources such as wind, solar, hydropower, nuclear, and hydrogen and explained how each could contribute to Nigeria's sustainable development. Additionally, the key elements addressed in the Policy aim to develop, promote and harness the country's renewable energy resources and incorporate all the viable ones into the national energy mix.[93]

3. Electric Power Sector Reform Act (EPSRA): This is the principal law regulating electricity generation and supply in Nigeria. The Act emphasizes the role of renewable electricity in the overall energy mix, especially for expanding access to rural and remote areas. Part III of the Act establishes the Nigerian Electricity Regulatory Commission which is responsible for licensing and regulation of electricity generation through conventional and renewable sources, transmission, distribution and supply of electricity in the country.

4. Renewable Energy Policy Guidelines (REPG) 2006: This policy guideline provides a common framework to integrate carbon-neutral renewables into the energy industry

[91] The legal framework for renewable energy in Nigeria. (2019). *Lexology*. <https://www.lexology.com/contributors/1156557/> Retrieved August 10, 2022.
[92] NATIONAL ENERGY POLICY, 3 (2003). <http://rea.gov.ng/wp-content/uploads/2017/09/National_Energy_Policy_Nigeria.pdf> Accessed August 12,2022
[93] Daudu, S., & Idehen, S. (2021). *An Examination of the Implementation of Existing Policies on Renewable Energy in Nigeria: How Effective? 9*(05). <https://www.scirp.org/journal/papercitationdetails.aspx?paperid=109470&JournalID=2433> Accessed, August 12, 2022.

to meet the national electricity supply. Furthermore, it sets out the Federal Government's vision, policies, and objectives for promoting renewable energy in the power sector. The Policy Guidelines are drawn primarily from the Constitution of the Federal Republic of Nigeria (1999), the National Energy Policy (2003), the National Electric Power Policy (2001), Electric Power Sector Reform Act (2005), the Renewable Energy Master Plan (2005), the draft Rural Electrification Policy and the National Economic Empowerment and Development Strategy (NEEDS). The REPG 2006 provides that the Federal government of Nigeria would take steps to ensure renewable energy to at least 5% of the total electricity generated in Nigeria by 2016.

5. National Renewable Energy Efficiency Policy 2013: The National Renewable Energy and Energy Efficiency Policy (NREEEP) has replaced the REPG. The NREEEP came into force because of the need to design a policy specifically focusing on renewable energy. Hence, it consolidates all previous renewable energy policies and strategies in one document. The policy addresses issues like renewable energy utilization and supply, pricing and financing, legislation, regulation and standards, energy efficiency and conservation, research and development, training, and capacity building. NREEP acknowledges the need to promote renewable energy in Nigeria to reduce the adverse effects of the use of fossil fuels on the environment and states the need for legislative and regulatory structures to be put in place.

6. National Renewable Energy Action Plan 2016: Historically, the National Renewable Energy & Energy Efficiency Policy (NREEEP) directs the development of the National Renewable Energy Action Plan (NREAP) within 6-12 months following the approval of the NREEEP in 2015. The plan contains existing and currently planned measures with which the national target on renewable energy is to be achieved. It provides an overview of concrete policy and regulations, laws, incentives, and measures to be implemented by the country to achieve these targets, as well as the set-out targets under the Sustainable Energy for All l (SE4ALL) goals.

7. Regulations on Feed-In-Tariff for Renewable Energy Sourced Electricity in Nigeria (REFIT): This regulation was passed in 2015 to encourage the use of Renewable energy in Nigeria by mandating the energy distribution companies to source at least 50% of their total procurement from renewables. REFIT also provides that a total of 1,000MW by 2018 and 2,000 MW by 2020 should be generated through renewables such as biomass, small hydropower, wind, and solar connected to the grid. REFIT also provides a special tariff framework for renewables, in the form of feed-in-tariffs, designed to make renewable energy attractive to private investors.

8. Climate Change Act 2021: This Act was a product of the COP26, where countries renewed their commitment to secure net-zero targets by mid-century and to keep the 1.5degrees target within reach; protect communities and natural habitats; mobilize finance to deliver on the first two goals, and work together to deliver on the various goals. During the conference, Nigeria committed to achieving net zero by 2060. A week after the conference, President Muhammadu Buhari signed the Climate Change Act, of 2021. The Act provides a framework for achieving low GHG emissions and mainstream climate change actions into national plans and programs**.** The Act mandates that Nigeria's public and private entities implement mechanisms that foster a low-carbon emission, environmentally sustainable, and resilient climate society. To ensure compliance, the Act designates a climate change officer responsible for submitting annual reports to the National Climate Change Secretariats.

9. Order on the Mandatory Dispatch of Hydropower Plants in the Nigerian Electricity Supply Industry 2019: **T**he Nigerian Electricity Commission made the Order on the Mandatory Dispatch of Hydropower Plants 2019 per Sections 32 and 66 of the Electric Power Sector Reform Act (EPSRA). Section 66 mandates the Licensed System Operator (SO) to carry out the system operation, generation scheduling, commitment, and dispatch in the Nigerian Electricity Supply Industry. It took effect on the 18th day of September 2019. The Order designated the three major hydropower stations, Jebba, Kainji, and Shiroro, as "must-run" powerplants. Furthermore, the SO must ensure strict compliance with the Order.

10. Renewable Energy Master Plan (REMP): The REMP is a policy that is being carried out by the Nigerian Ministry of Environment to bolster the electricity supply in the Nigeria and to improve grid reliability and security. It aims to increase the supply of renewable electricity from 13% of total electricity generation in the country in 2015 to 23% in 2025 and 30% in 2030 so that by 2025 renewable energy would be responsible for 10% of the Nigeria's energy consumption by 2025[94]. The plan also includes installed capacity targets for Solar, Biomass, Hydropower and Wind energy[95]. It intends to increase the supply of Small-hydro from 600MW in 2015 to 2000MV by 2025, the supply of Solar PV to 500MW, Biomass from 50MW in 2015 to 400 MW and Wind energy to 40 MW by 2025[96]. The REMP targets more

[94] Nigeria Renewable Energy Master Plan, https://www.iea.org/policies/4974-nigeria-renewable-energy-master-plan Acessed 29th of August, 2022
[95] Ibid
[96] Ibid

electrification rates from 42% in 2005 to 60% in 2015 and 75% in 2025[97]. The REMP also seeks to execute certain fiscal and market inducements to suspend import duties on renewable technologies on short term basis and proffers the creation of tax credits, capital stimulus and favorable loan opportunities for renewable energy projects[98].

## Challenges Hindering Renewable Energy Development in Nigeria

1. Lack of adequate structure for implementing the existing laws on renewable energy: Presently, Nigeria has a considerable number of policies and laws that would attract domestic and international investments and encourage the use of renewable energy. However, passing laws on renewable energy to achieve sustainable development without good implementation structures is like planning without executing.

2. High cost of adopting renewable energy: The up-front capital cost for renewable energy in the country is higher than that of conventional energy projects.[99] On the need to support solar energy, the Lagos State Ministry of Energy and Mineral Resources observe that: "Traditionally, the cost of a solar installation may be 3-5 times the cost of deploying a fossil fuel fired solution of similar capacity".[100] One of the reasons why renewable energy is expensive is because of the process of storing the energy. For instance, during the installation process of solar energy, one would need to buy a solar panel, followed by the battery which is expensive to store the energy.

3. Public awareness: The Majority of the Nigerian citizens do not understand the potentials of renewable energy nor its possibility of ensuring sustainable development in Nigeria. Also, the few people who are aware of it have the misconception that this form of energy technologies are not mature and only suited for niche markets. Consequently, the inadequacy of awareness creates a market distortion which results in higher risk perception for potential renewable electricity projects.[101]

4. Standards and quality control: Undeniably, creating quality assurance is a precondition for building consumer confidence, especially in the growing market for

[97] Ibid
[98] Ibid
[99] Kalu Uduma and Tomasz Arciszewski, "Sustainable Energy Development: The Key to a Stable Nigeria" (2010) 2 Sustainability 1558, 1565.
[100] Lagos State Ministry of Energy and Mineral Resources, Consultation Document for the Development of a Renewable Energy Policy (Lagos State Ministry of Energy and Mineral Resources 2012) 14
[101] NATIONAL POLICY Guidelines, (2006). <https://www.iceednigeria.org/resources/dec.-2006.pdf> Accessed August 22,2022

renewable energy. Unfortunately, this is a major hindrance to the development of the renewable energy market due to the absence of a structurally established standard and quality control of locally manufactured and imported technologies in the country. Not only that, the absence of standard and quality control causes the renewable energy market to have a poorly developed regime for standards setting, testing and certification, as well as professionalism among operators. This consequently affects the perception of potential users.

5. Technological Barrier: Nigeria's renewable energy supplies and servicing are not readily accessible. Consequently, this poses a challenge in procuring equipment and maintenance support for renewable electricity projects.

6. Reliance on fossil fuels: Nigeria's economy mainly depends on fossil fuels for energy generation because of the low cost of production compared to the use of renewable energy in the country.

7. Political instability: Presently, some parts of Nigeria are not politically stable, which affects energy investments in those places. For example, Northern and Eastern Nigeria have respectively been the territory for insurgent activities of Boko Haram and militants. Their actions in the last decade have destroyed some infrastructure and, consequently, threatening and preventing high-risk investment for local and foreign companies in renewable energy technology or installation due to fear of destruction.

8. Data Aggregation: Poor access to accurate and timely data or information on renewable energy has been a major barrier to effective policy and decision-making in Nigeria.[102] For example, it is difficult to ascertain the total wattage number of solar PV installations operational across the country. Consequently, inadequate data aggregation can affect the public support of the adoption of renewable energy.

## Recommendations

Electricity is generated in Nigeria from fossil fuels, particularly gas, which constitutes 86% of the amount of electricity generated in the country, with the bulk of the remainder being derived from hydropower[103]. Therefore, in order for Nigeria to resolve its energy crisis and achieve its climate objectives, there is a need to implement strategies to jump-start the

[102] Akuru U, Onukwube I, Okoro I. "Towards 100% renewable energy in Nigeria." <https://www.sciencedirect.com/science/article/abs/pii/S1364032116311716#!> Accessed August 24, 2022

[103] By Oyewo, Ayobami; Aghahosseini, Arman; Bogdanov, Dmitirii; Breyer, Christian (2018-12-15) Pathways to a fully sustainable electricity supply for Nigeria in the mid-term future. Energy Conversion and Management, vol. 178, pp. 44-64. DOI: 10.1016/j.enconman.2018.10.036

transition process of the country's economy to clean energy.

(a) The Nigerian government needs to divert energy subsidies from fossil fuel to renewables. Petroleum subsidy is one of the biggest roadblocks inhibiting the swift transition to clean energy in Nigeria and world in general. The Nigerian government subsidizes crude oil by fixing the price of gasoline and other petroleum products below the international market price and makes use of its resources to pay the difference, which according to the IMF directly benefits only 20% of its population[104]. The IMF declares that nearly $5.9 trillion was spent globally to subsidize the fossil fuel Industry in 2020[105]. In that year, the Nigerian government spent approximately, N450billion to subsidize the cost of petroleum after expending the sum of N10.413 trillion via fuel subsidies between 2016 - 2019[106]. In 2022 alone, the total cost of fuel subsidies reached an alarming sum of 396.72 billion in January and February[107]. Furthermore, the Minister for Finance- Zainab Ahmed recently projected that the country will spend about N6.7 trillion peradventure it decides to retain subsidy by next year[108]. Thus, shifting of subsidies to renewable energy would not only reduce GHG emission but also contribute to economic growth, job creation, and better public health and adequate distribution of wealth.

(b) The existing legal framework on renewable energy should be re-designed in such a way as to accommodate both federal and state government participation in policymaking, promotion, and development of renewable energy. This way, the state governments would be able to create programs that would facilitate alternative energy development, make robust domestic policies that would support clean energy development in their respective territories, and augment existing federal legislation on the subject.

(c) It is an obvious fact that there is no clear-cut legislation for the development of renewable energy in Nigeria. The enactment of the Electricity Power Sector Reform Act which has been touted by many writers as the "Right step in the right direction" is only a legislative move to privatize the electrical sector for the purpose of ensuring efficient power

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[104] Five ways to jump-start the renewable energy transition now https://www.un.org/en/climatechange/raising-ambition/renewable-energy-transition?gclid=CjwKCAjw9suYBhBIEiwA7iMhNDqlQNIcqeAxypokr11KHv68Ur-YoG8HU4lwOVMV2bm-_3fxfhr-vxoCYTMQAvD_BwE Accessed 31st of August 2022

[105] Ibid

[106] By Emma Ujah, & Obas Esiedesa " N4trn Bill : How petrol subsidy grew by 349.42% in 3 years" https://www.vanguardngr.com/2022/04/n4trn-bill-how-petrol-subsidy-grew-by-349-42-in-3-years/ Accessed 31st of August 2022

[107] Ibid

[108] By Mary Izuaka "Retaining petrol subsidy in 2023 will cost Nigeria nearly N6.7 trillion — Govt https://www.premiumtimesng.com/news/top-news/544279-retaining-petrol-subsidy-in-2023-will-cost-nigeria-nearly-n6-7-trillion-govt.html Accessed 31st of August 2022

distribution and the creation of legal boundaries to promote electricity infrastructure in the country. It is also clear that there are overlaps and duplication of roles and duties of regulatory bodies involved in the regulation of renewable energy in Nigeria. The absence of clearly defined roles of regulatory bodies would not create only hectic procedures for investors, but also discourage potential investors from investing in the sub-sector. Therefore, there is a need to re-organize the duties of these regulatory bodies to paint a smooth, favorable, and investor-friendly environment for current and prospective investors.

(d) The Federal government of Nigeria should work with states and local governments to create public awareness about the immediate and long-term effects of fossil fuels on the environment. This awareness should also include introducing renewable energy sources to the public to enhance support for its adoption in Nigeria. To achieve this, investment in education is a smart move as this would also help the average Nigerian in school understand the basis for the adoption of renewable energy, which would subsequently foster sustainable development in the country.

(e) The government should establish an institutional body that would be responsible for monitoring and ensuring quality assurance for locally manufactured and imported technologies for renewable energy in the country. In establishing this body, the government should understand that members of the institution need technical skills to understand modern technological innovations, and have a broad vision of how renewable energy works. Hence, the government must be willing to invest in the required human capital for this institution to achieve its goal.

(f) The Nigerian Investment Promotion Act already provides some incentives for certain investments, the government should be more intentional about attracting foreign and local investors by placing more incentives on investments relating to renewable energy projects. These incentives may include but are not limited to pioneer status, tax exemption, low custom duties, and profit repatriation among others.

(g) Nigeria needs to focus on other sources of income by diversification. As previously mentioned, Nigeria being one of the biggest producers of crude oil is largely dependent on revenue generated from fossil fuels which involve environmentally damaging activities, which increased its global share of greenhouse gas emissions. Accordingly, a shift from crude oil to other resources and agricultural industries will help to reduce the effect of the combustion of crude oil on the environment.

(h) Finally, the International Energy Agency (IEA) forecasted that oil and gas sector revenue would jump to $4 trillion in 2022, a major part of it will go to major oil and gas exporting

states[109]. These oil windfall would benefit oil producing countries including Nigeria, which should seize this rare opportunity to invest the surplus sum into the development of renewable energy.

## Conclusion.

Developing and developed countries of the world are making considerable efforts to transition their respective territories from fossil fuel-based regimes to clean energy-based ones to end climate change and achieve energy security. Although Nigeria is not found wanting in this regard, the country still faces certain challenges hindering the development of renewable energy, the most prominent of which is the absence of an encompassing framework to spur the proliferation of sustainable energy. The existing renewable energy framework consists of overlapping policies that lack legislative flavour or force of law. Thus, Nigeria must either enact new legislation or revise and subsume all the extant policies into one document (legislation) to promote sustainable development in the country. Lastly, the law must specify ways of developing and managing all forms of renewable resources prevalent in the country and create the pathway for a clean energy transition.

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[109] Ibid at 26

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