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RENEWABLE ENERGY TRANSITION IN SUB-SAHARAN AFRICA: LEGAL PROSPECTS, CHALLENGES AND STRATEGIC PATHWAYS FOR NIGERIA

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The transition to renewable energy is gaining global momentum as countries strive to address climate change, ensure energy security, and achieve sustainable development. In Sub-Saharan Africa, however, the shift from fossil fuels to cleaner energy sources remains uneven, with numerous structural, legal, and institutional challenges impeding progress. This paper critically examines the legal prospects and barriers surrounding renewable energy adoption in the region, with a particular focus on Nigeria the continent's most populous nation and one of its largest oil producers. Drawing on comparative legal analysis and policy evaluation, the study explores how existing legal frameworks either promote or hinder renewable energy development. It further identifies gaps in regulation, inadequate enforcement mechanisms, and the absence of coherent energy transition policies as key obstacles. The paper proposes strategic legal reforms tailored to Nigeria's socio-economic and environmental needs, emphasising the need for clear legislation, robust institutional support, and targeted incentives to attract investment in clean energy. By aligning national energy laws with global best practices, Nigeria and its Sub-Saharan counterparts can accelerate the shift toward sustainable energy systems. This study contributes to the broader discourse on environmental governance and energy justice in the Global South, offering practical legal pathways for a just and inclusive energy transition.

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1. INTRODUCTION

The goal of Sub-Saharan Africa's renewable energy transition is to improve energy access, affordability, and dependability using a variety of sources, including solar, wind, and hydropower, while tackling issues like stranded assets and lost petroleum revenue.[1] Shifting to less expensive, low-carbon, and renewable energy sources is the penultimate energy policy of an African government in order to address the issues of affordability, accessibility, and dependability.[2] Africa must participate in the value chain rather than just be a technology consumer. It is important to start developing industries centred around the resources that are needed for the energy transition. Africa's energy needs to be met by a mix of wind, solar, hydro, gas-fired thermal facilities, and concentrated solar power. In addition to natural gas, which has numerous uses outside of power generation, African nations should focus on the deployment of renewable energy sources, such as grid solar for rural and residential urban regions, natural gas for industry and industrial heating, and hydro as a baseload.[3]

Fossil fuels and inefficient hydro systems are the main sources of energy for almost all developing and sub-Saharan African nations. These nations must look for innovative ways to move away from their reliance on antiquated techniques and towards more contemporary and effective energy generation methods in light of the worldwide trend towards cleaner, renewable, and sustainable forms of energy generation. Furthermore, producing energy with these ineffective and damaging techniques has a very detrimental effect on the environment. Wide-ranging repercussions result from the detrimental impact on the region's residents' economic and health conditions. Moreover, social insecurity in the area and theft and vandalism of energy transmission and generation equipment

[1] Ishmael Ackah, Rexford Kweku Asiama, Albert Okanto Ohene, Vera Adobea Essuman, Maame Esi Eshun, Charles Owusu, and Patrick Nyarko, 'The Gains and Pains of the Energy Transition: A Perspective on Sub-Saharan Africa' (2024) Book Chapter <10.1007/978-3-031-52677-0_20> accessed 1 April 2025
[2] Ibid
[3] Ibid n1.

have resulted in extremely low-capacity efficiencies, which have hugely wasted natural and human resources. [4]

Although a sustainable energy transition in Sub-Saharan Africa is feasible, it is complicated by a number of relevant environmental factors, and the region's energy transition is crucial to the overall development and advancement of almost every aspect of the environment.[5]

There is no question that Nigeria's current power crisis will continue without the government diversifying energy sources in the residential, commercial, and industrial sectors and implementing new technologies to cut down on energy waste and save money.[6] Renewable energy is the best option for diversifying sustainable energy sources. The development of renewable energy projects is viewed as a huge opportunity from a strategic and financial point of view, as well as from a technological and environmental aspect.[7] The government plays a major role in ensuring the success of renewable energy development and deployment.[8] Recently, there has been a lot of focus on renewable energy and energy efficiency measures as the only way to address the problem of clean energy provision.[9] This is accomplished by implementing appropriate procedures, creating strategic plans, and establishing strategic policies. Through subsidies, taxes, funding for power generation, and grid access for renewable energy electricity generators, these have the ability to change the cost of renewable energy technologies.[10]

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[4] Charles Adulugba, 'Sustainable Energy Transition in Sub-Saharan Africa. In: Asif, M. (eds) Energy and Environmental Security in Developing Countries' (2021) *Advanced Sciences and Technologies for Security Applications*. Springer, Cham

[5] Ibid.

[6] SO Oyedepo, 'Towards Achieving Energy for Sustainable Development in Nigeria' (2014) 34 Renewable and Sustainable Energy Reviews 255–272

[7] RA Springer, 'Framework for Project Development in the Renewable Energy Sector' (2013) 303 Contract 275–3000 https://doi.org/10.2172/1064514 accessed 8 May 2025

[8] S Olz, 'Renewable Energy Policy Considerations for deploying renewables' (2011)

[9] D Ahuja and M Tatsutani, 'Sustainable energy for Developing Countries' (2009) 2(1) SAPI EN. S. Surveys and Perspectives Integrating Environment and Society

[10] Nnaemeka Vincent Emodi and Nebedum Ekene Ebele 'Policies Enhancing Renewable Energy Development and Implications for Nigeria' (2016) 4(1) Sustainable Energy 7–16 <http://pubs.sciepub.com/rse/4/1/2, DOI:10.12691/rse-4-1-2> accessed 2 April 2025

Thus, the objective of this paper is to analyse the renewable energy transition in Sub-Saharan Africa by interrogating its prospects and challenges in Nigeria. The paper is divided into seven sections. The first being the introduction, followed by the second which examines the renewable energy potential in Nigeria. It also examines challenges to renewable energy transition in Nigeria and legal and policy framework for renewable energy in Nigeria. It ends with a summary of findings, recommendations for a sustainable energy future and a conclusion.

2. OVERVIEW OF NIGERIA'S RENEWABLE ENERGY SOURCES

The importance of energy stability and efficiency cannot be over emphasised for the growth and development of economies across the world[11]. Energy is very vital to all sectors of the economy and as such, it is trite that every nation must have a steady supply of energy to function properly. Similarly with growing evidence of the emerging effects of global climate change on human life and survival, policymakers around the world are considering renewable energy options as a means of reducing reliance on non-renewable energy sources like fossil fuels, which have numerous negative effects on the environment, human health, and the economy.[12]

The World Bank reports that over 1.4 billion people globally, mostly in Africa, lack access to electricity.[13] In Nigeria, for instance, many households and businesses often experience weeks without electricity and this has adversely affected the production activities across all sectors in the country. The country's overall power generation currently stands at 3,000-4,000 MW, a significantly low figure for a nation with more than

[11]Hillary A Ojeke, 'An Overview of Renewable Energy in Nigeria' https://j-kgadzamallp.com/images/Newsletters/An_Overview_of_Renewable_Energy_in_Nigeria_-*Hillary_Ojeke*-_J-K_Gadzama_LLP.pdf accessed 7 March 2025

[12] CO Chukwuma, EO Francis, AA Adeolu, MI Enoch, TA Esther, Rasheedat Mahamood, 'Renewable Energy in Nigeria: Potentials and Challenge' (2021) 56(3) Journal of Southwest Jiaotong University https://jsju.org/index.php/journal/article/view/924 accessed 10 March 2025

[13]Damilola S Olawuyi, *The Principles of Nigerian Environmental Law* (Revised edition, Afe Babalola University Press, 2015) 228

150 million inhabitants. Estimates show that to meet current energy demands and address power shortages, the country must generate at least 40,000MW.[14] Power generation in Nigeria dates back to 1896 when the first power plant was established in Ijora, Lagos.[15] Following this, several other power plants and grids were built, including those in Kainji and Shiroro, among others. However, many years of oppressive military rule, corruption, and neglect led to inadequate investment in infrastructures within the power sector, causing many existing power plants to deteriorate. As a result, power generation and supply in Nigeria have been inconsistent and, at times, nearly non-existent for several years now. Currently, only about 40% of the country's population has access to electricity, and even this 40% do not experience a reliable and steady power supply. The poor power supply, which has caused significant losses across various sectors of the economy, is also directly linked to the high rate of poverty in the country. This reveals energy supply's pivotal role in reducing poverty in developing nations like Nigeria. In a bid to address the ongoing issue of unstable power, the United Nations introduced the Sustainable Development Goal 7, which aims to provide affordable, reliable, sustainable, and modern energy for all. Currently, the energy strategies being utilised in Nigeria are poorly maintained and are far from being sustainable with many rural communities lacking access to the national electricity grid.

In Nigeria, majority of energy is derived from non-renewable sources such as petroleum, coal, and natural gas, and this has led to significant environmental issues, including acid rain and, most notably, global warming, now commonly referred to as climate change. Despite being a major exporter of fossil fuels, Nigeria's energy crisis remains appalling, highlighting the urgent need to transition to renewable energy sources. These challenges have spurred renewed calls for the Nigerian government to explore the potentials of renewable energy as a solution to the country's

[14] Ibid
[15] Ibid

energy generation and supply issues. Currently Nigeria is the largest emitter of GHGs in Africa, reducing dependence on conventional energy sources could help the country shift to cleaner, more sustainable energy sources.[16]

2.1 Comparative Analysis of Renewable Energy in Nigeria, South Africa and Kenya

Africa holds some of the largest reserves of both renewable and non-renewable energy sources globally, yet it is responsible for half of the world's power deficit.[17] In light of this, many African nations are focusing on developing their energy sectors to enhance their economic, social, and political reforms. South Africa and Kenya, for instance, have made significant investments in their renewable energy sectors and are now enjoying the benefits of a robust and comprehensive energy infrastructure. The approaches taken by these countries provide valuable lessons for other African nations, such as Nigeria, that are anticipating to grow and transition to the renewable energy sectors.

South Africa

South Africa is geographically situated between latitudes 4.0° N and 12° N and longitudes 3.1° W and 1.2° E, covering an approximate area of 238,533 km². The country exports electricity to neighbouring nations, including Zimbabwe, Lesotho, Swatini, Namibia, Botswana, Mozambique, and Zambia, and holds a Renewable Energy Country Attractiveness Index (RECAI) score of 54.2%.[18] South Africa began its rapid shift towards renewable energy in 2003 with the introduction of a renewable energy policy. The country is making notable progress in expanding its renewable energy sector, utilising various sources to meet its

[16] Ibid

[17] Yara Lima, 'Renewable Energy in Africa: Kenya's Success and its Possible Implementation in Angola' (The Payne Institute For Public Policy at Colorado School of Mines, 2023) http://payneinstitute.mines.edu/renewable-energy-in-africa-kenyas-success-and-its-possible-implementation-in-angola/ accessed 9 May 2025

[18] E Mokwena, *2022 South African Energy Trade Report* (Directorate: Energy Economics and Statistics, Department: Republic of South Africa, 2022) 35 https://www.dmre.gov.za/Portals/0/Energy_Website/files/media/explained/2022-South-African-Energy-Trade-Report.pdf accessed 9 May 2025

energy needs and reduce dependence on fossil fuels. Its geographic advantages, coupled with strong government support, have positioned renewable energy as a central focus for both economic and environmental sustainability.[19]

South Africa's abundant natural resources, including 42 million hectares of woodlands and 1.35 million hectares of plantations, offers significant opportunities for biomass production.[20] The government's "Working for Energy Programme" is focused on processing biomass for energy use, helping to develop this sector and advance sustainable energy goals. The country also benefits from hydropower, with seven hydroelectric power stations operated by ESKOM. These dams provide renewable energy while also supporting irrigation and flood control, thus contributing to the country's economic development.[21] Wind energy is another growing resource, with 19 wind energy projects and over 600 wind turbines in operation.[22] While South Africa's wind resources are considered moderate by international standards, the country continues to explore wind energy as a viable renewable power source.[23] Of all these sources solar energy holds the greatest potential due to the country's advantageous location, which ensures abundant sunlight year-round. Solar, along with wind energy, is expected to play a significant role in South Africa's renewable energy future. In summary, South Africa's renewable energy sector is diverse and growing, with major investments in solar, wind, biomass, and hydropower. These efforts aim to meet the country's energy needs, reduce greenhouse gas emissions, and drive economic growth. With continued government support and investment in

[19] B Khoza, 'Renewable Energy and South Africa's Energy Transition: Policy Challenges and Opportunities' (2022) Energy Policy Review https://www.energypolicyreview.co.za/renewable-energy-south-africa accessed 13 March 2025

[20] South Africa's Renewable Energy Push and the Challenges Ahead' *The Guardian* (2022) https://www.theguardian.co.za/renewable-energy-south-africa-challenges accessed 13 March 2025

[21] Ibid.

[22] G Greyling, 'The Role of Wind and Solar Power in South Africa's Energy Landscape' (2021) Renewable Energy South Africa https://www.renewableenergy.org.za/wind-solar-energy-in-south-africa accessed 13 March 2025

[23] Ibid

renewable energy technologies, South Africa is positioning itself as a leader in sustainable energy in Africa. South Africa has taken significant step in adopting renewable energy as part of its dedication to sustainable development. As a member of the International Renewable Energy Agency (IRENA), the country gains access to IRENA's resources and expertise, which help in developing effective policies and supporting the technological transition required for renewable energy.[24] This includes conducting resource assessments, managing finances, and enhancing the energy sector's capacity to support a transition to cleaner energy sources.

One of South Africa's early initiatives was the launch of the Renewable Energy Feed-In Tariff (REFIT) in 2009. The REFIT programme was designed to reduce dependence on carbon-based power generation by encouraging renewable energy sources such as wind, hydropower, and concentrated solar power (CSP). Six months after its inception, the programme was expanded to include biomass and solar photovoltaics. This expansion helped the country work towards its goal of generating 10TWh of electricity by 2013. Through REFIT, South Africa aimed to make renewable energy more affordable, engage stakeholders, and attract investment to address its energy challenges. REFIT also became the country's first successful greenhouse gas mitigation project, though it was later replaced by the Renewable Energy Independent Power Producers Procurement Programme (REI4P) in 2011. Launched in 2011, the REI4P programme set a goal of installing 17.8 GW of renewable energy capacity in South Africa by 2030.[25] The programme aims to reduce greenhouse gas emissions and decrease the country's reliance on non-renewable energy sources such as coal and nuclear power. In addition to promoting the use of renewable energy, REI4P also focuses on fostering local manufacturing of renewable energy materials. To further encourage renewable energy growth, South Africa introduced a tax incentive in 2016 under the Income Tax Act, allowing for the accelerated depreciation of renewable energy assets. This amendment encourages private sector investment in renewable energy generation systems, whether newly installed or not. Through these initiatives, South Africa is working to

[24] Ibid
[25] Ibid

diversify its energy mix, cut carbon emissions, and drive economic growth in the renewable energy sector.

The Renewable Energy White Paper, formulated in 2003 by the Department of Minerals and Energy, established the foundation for renewable energy development in South Africa.[26] The Integrated Resource Plan outlines a long-term strategy for diversifying power sources by 2030 to meet growing energy demand through renewable energy sources (RES). The renewable energy policy focuses on several strategic areas:

1. Redirecting national resources and investments to renewable energy technologies while providing fiscal incentives.
2. Creating effective legislative instruments to facilitate the spread of renewable energy.
3. Promoting Research and Development (R&D) of Renewable Energy Technologies (RETs) through guidelines, standards, and supporting local manufacturing.
4. Raising public awareness through training centres, better information dissemination strategies, and government communication.
5. Establishing technology support centres, such as the National Energy Research Institute.

South Africa's renewable energy goals include decommissioning 35 GW of the 42 GW of existing coal-fired power capacity and generating at least 20 GW of the additional 29 GW of electricity needed by 2030 from renewables and natural gas.[27] With this solid renewable energy framework, South Africa's renewable energy capacity is expected to grow by more than 13 GW from 2022 to 2027. Additionally, the country aims to build 20% hybrid electric vehicles by 2030.[28]

The justification for the selection of South Africa and Nigeria's is that both countries experiences with renewable energy serve as a most-similar case study, as both countries have pursued similar policies to attract

[26]M Kgosana, , 'Navigating the Challenges of Wind Energy Development in South Africa: Legal and Policy Considerations' (2022) *Energy Law and Policy Journal* <https://www.energylawjournal.co.za/wind-energy-south-africa> accessed 13 March 2025.
[27] Ibid.
[28] Ibid.

investment in renewable energy and share comparable economic, geopolitical, and other characteristics. Notwithstanding, their approaches have resulted in different outcomes regarding renewable energy adoption. While South Africa has been largely successful in drawing investment and steadily increasing its renewable energy capacity, Nigeria has struggled to achieve similar progress. Although both countries have implemented similar policies to boost renewable energy uptake, the results have been far from identical. South Africa's policies have proven effective in attracting investments, leading to continuous growth in its renewable energy sector.

Internationally, South Africa is recognized as a leading example in Africa for its significant progress in energy transition. In 2015, South Africa attracted over 4.5 billion US dollars in renewable energy investments, making it the seventh-highest in the world for such investments in that year. This represented a remarkable increase compared to 2014.[29] South Africa also holds the largest share of installed solar and wind capacity in Africa, with a total solar capacity of 5.99 GW, making up over 54% of Africa's total installed capacity, and 41% of the continent's wind capacity.[30] This achievement is even more impressive considering that, before 2011, there was almost no private sector involvement in the energy sector, which was predominantly controlled by the state-owned ESCOM utility. As of 2023, South Africa had the largest solar energy capacity in Africa reaching over six gigawatts. The success of South Africa's policies can be attributed to their thoughtful design, management, and implementation. In contrast, Nigeria has made slow progress in adopting renewable energy, despite its vast renewable energy resources. Nigeria's only significant developments in renewable energy have been in hydropower projects established years ago and small-scale solar initiatives, primarily for household use and street lighting.

Nigeria can learn from South Africa's success in renewable energy by adopting clear, long-term policies like the Renewable Energy Independent

[29] Christine Mungai, 'How green energy will change Africa' (World Economic Forum, 2015) https://www.weforum.org/stories/2015/07/how-green-energy-will-change-africa/ accessed 9 May 2025
[30] Ibid

Power Producer Procurement Programme in South Africa (REIPPPP) to attract investment. Strengthening public-private partnerships, improving grid infrastructure, and prioritising local content development are key strategies. Additionally, implementing competitive bidding for projects can reduce costs and increase efficiency. Focusing on off-grid solutions and regulatory support will also enhance energy access.

Kenya

Kenya is the 7th most populous country in Africa, with an estimated population of 47.6 million. It is located at 1°00′N latitude and 38°00′E longitude, covering a land area of approximately 569,140 km².[31] Situated in East Africa, Kenya is renowned for its scenic landscapes and abundant wildlife reserves. Kenya serves as an exemplary model of a nation that has overcome challenges to establish a robust and thriving renewable energy sector. The country has been developing its renewable energy sector since 1996 and is now one of the most advanced and active renewable energy markets in Africa.[32] Kenya has made significant progress in expanding access to electricity, particularly through the adoption of renewable energy (RE) technologies.[33] Over the past few decades, the country's energy sector has undergone considerable transformation, guided by various legislations, policies, and regulations, such as the Sessional Paper No. 4, 2004 on energy, the Energy Act No. 12, 2006, and the Geothermal Resources Act No. 12,1982. A large portion of Kenya's electricity is produced from renewable energy sources. Access to reliable, affordable, and sustainable energy is one of the 17 key goals outlined in the United Nations' Sustainable Development Goals, 2015 and energy development is crucial for Kenya to achieve its Vision 2030 objectives of becoming a newly industrialised, middle-income nation.[34] With an installed power capacity of 2,819 MW, Kenya currently generates

[31] *Country Fact Sheet* https://kenyaembassyspain.es/wp-content/uploads/2024/09/COUNTRY-FACT-SHEET-1-2.pdf accessed 9 May 2025
[32] KR Ibrahim, K M Peter, Hilda Chepkirui, 'Renewable Energy Status and Uptake in Kenya' (2024) Energy Strategy Reviews https://www.sciencedirect.com/science/article/pii/S2211467X24001603 accessed 12 March 2025
[33] Ibid.
[34] Ibid.

826 MW from hydroelectric power, 828 MW from geothermal, 749 MW from thermal, 331 MW from wind, with additional contributions from solar and biomass.[35] Kenya is the largest producer of geothermal energy in Africa and is home to the continent's largest wind farm, the Lake Turkana Wind Power Project. In March 2011, Kenya also launched Africa's first carbon exchange to attract investments in renewable energy projects. Additionally, Kenya has been chosen as a pilot country under the Scaling-Up Renewable Energy Programmes in Low-Income Countries initiative to enhance the deployment of renewable energy solutions in low-income nations.[36]

The Kenyan government has been implementing a series of reforms to improve the country's energy sector and achieve its electrification goals. As at 2018, renewable energy sources accounted for approximately 70% of Kenya's electricity, and this figure increased to 87% by 2020. The rapid growth of Kenya's renewable energy sector is the result of a well-structured strategy aimed at ensuring energy security and attracting private investment. Various energy policies have been introduced since 1996, and in 2008, Kenya launched the "Kenya Vision 2030," a plan designed to drive the country's economic, social, and political development. This vision emphasized the importance of energy for national growth and focused on reducing energy poverty while strengthening the country's economic and political structures.[37]

As part of its efforts to achieve energy security, Kenya restructured its primary power company, Kenya Power and Lighting Company (KPLC), in 2008. Initially fully government-owned, KPLC was responsible for power generation, transmission, and distribution. Following the reforms, KPLC was split into three independent entities: Kenya Electricity Generation Company (KenGen) for power generation, Kenya Electricity Transmission Company (Ketraco) for transmission and infrastructure development, and KPLC for distribution. By 2014, Ketraco had expanded the transmission network by 1,000 kilometers, which improved the distribution of power from large-scale plants. This expansion contributed to an increase in Kenya's electrification rate, rising

[35] Ibid
[36] Ibid
[37] Ibid

from 30.3% in 2008 to 36% in 2014. In 2019, Kenya enacted The Energy Act 2019, which covered regulations on energy generation, transmission, distribution, and sales.[38] This legislation also outlined the responsibilities of various governmental bodies and regulated the use of coal, petroleum, and renewable energy sources. The Energy Act 2019 introduced several reforms and policies aimed at expanding the renewable energy sector while encouraging private investment and promoting electrification in rural areas. The success of Kenya's energy sector can largely be attributed to two key strategies: (1) the development and implementation of energy policies, and (2) incentives for private investment in the energy industry. The country's regulatory framework has been a significant factor in attracting private investment, which has played a crucial role in expanding Kenya's energy capacity.

To meet the renewable energy targets outlined in "Vision 2030," Kenya has initiated various solar energy projects. The Garissa Solar Power Plant, for example, has significantly lowered energy costs and become the largest solar plant in East and Central Africa. Other solar power plants either operational or under construction include Rumuruti (40 MW), Radiant (40 MW), Eldosol (40 MW), Alten (40 MW), Kenyatta University (10 MW), Malindi (52 MW), and Kopere (50 MW). Companies like M-Kopa offer pay-as-you-go models to make solar energy products more affordable and accessible to low-income families.[39] Additionally, partnerships between the World Bank and International Finance Corporation (IFC), as part of the Lighting Africa initiative, along with support from Western companies, have contributed to the spread of decentralised solar power solutions.[40] These efforts have made Kenya a global leader in solar power installations per capita.

In recent years, Kenya has implemented various policies designed to promote the growth of its renewable energy sector and attract both

[38] Catrina Godinho and Anton Eberhard, 'Learning from Power Sector Reform The Case of Kenya' (World Bank Group, Energy and Extractives Global Practice, 2019) https://documents1.worldbank.org/curated/en/451561555435655366/pdf/Learning-from-Power-Sector-Reform-The-Case-of-Kenya.pdf accessed 16 May 2025

[39] The Renewable Energy Institute, 'Kenya Leading the Way for African Renewable Energy Usage' https://www.renewableinstitute.org/kenya-leading-the-way-for-african-renewable-energy-usage/ accessed 12 March 2025

[40] Ibid

local and international investment. One of the primary financial incentives is tax relief, which offers investors full or partial tax deductions for investing in renewable energy projects.[41] A key example of this is the VAT Act 2013, along with its (as amended 2014). According to these laws, wind turbines and solar cells, with the exception of certain components like diodes or batteries, are exempt from import duties and VAT. Water wheels and hydraulic turbines are exempt from import duties but still face a 16% VAT. This tax relief helps lower the initial investment costs, making renewable energy projects more financially appealing.[42]

In addition to offering tax relief, Kenya provides guarantees to renewable energy investors. These guarantees ensure that all electricity produced from renewable sources will be purchased, thereby removing any uncertainty about the market for the energy generated.[43] This policy helps to significantly lower the risk for investors, making the sector more attractive to both local and foreign investors who may otherwise be deterred by market volatility. To further encourage investment, Kenya has introduced subsidized investment funds. These funds aim to reduce the financial risks linked to renewable energy investments by providing subsidies to companies investing in the sector. This policy not only cuts costs but also enhances the potential for greater returns on investment, thus drawing more companies to the renewable energy industry.

Another key policy that has significantly contributed to the growth of Kenya's renewable energy sector is the feed-in tariff (FiT). The FiT guarantees a long-term, fixed above-market price for electricity produced from renewable sources. This policy offers investors a predictable and secure return on investment, thereby reducing financial risks. The implementation of the FiT has been instrumental in attracting both local and international investment to Kenya's renewable energy industry.

Additionally, the introduction of net-metering has further supported the growth of renewable energy in Kenya. This policy allows

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[41] Ibid

[42] Ibid

[43] KE Paul, Mohammed Takase, Rogers Kipkoech, 'A Comprehensive Review of Energy Scenario and Sustainable Energy in Kenya' (2021) 7 Fuel Communications https://www.sciencedirect.com/science/article/pii/S266605202100008X accessed 10 March 2025

for a two-way flow of electricity between consumers and the national grid. By permitting consumers to feed surplus electricity from their renewable energy systems back into the grid, they earn credits that can be used to offset future electricity bills. This creates a financial incentive for consumers to invest in renewable energy while simultaneously contributing additional renewable power to the national grid.[44]

These policies work together to mitigate financial risks for investors, provide stable returns, and foster a sustainable energy transition. As a result, Kenya's renewable energy sector has successfully attracted both local and international investments, bolstering the country's energy security and environmental sustainability. In addition to its investment-friendly policies, Kenya's participation in the United Nations' Sustainable Energy for All Initiative (SE4All) further solidified its reputation as a transparent and reliable business environment.[45] Key actions taken by Kenya to encourage private investment included: (1) transparent and adequate business and legislative practices, (2) clearly defined goals, (3) a comprehensive understanding of available resources and technologies, and (4) heightened awareness of climate change and its impact on national development. As previously noted, Kenya's government made several institutional reforms and implemented various policies to attract both local and foreign investments and enhance the energy sector. These changes were made possible by strong leadership and bipartisan support. Drawing from Kenya's success, four critical reforms stand out for developing a nation's energy sector: (1) establishing a clear goal, (2)

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[44] The Energy (Net-Metering) Regulations, 2024: Paving the Way for Renewable Energy in Kenya' (Muhoro & Gitonga Associates, 2024) https://www.amgadvocates.com/post/the-energy-net-metering-regulations-2024-a-comprehensive-overview accessed 9 May 2025

[45] *Sustainable Energy For All Kenya Investment Prospectus Republic of Kenya Ministry Of Energy And Petroleum: Pathways for Concerted Action toward Sustainable Energy for All by 2030* https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country_IPs/Kenya_SE4All_IP_January_2016.pdf accessed 9 May 2025; The SEforALL Initiative, <https://www.se4all-africa.org/fr/the-africa-hub/who-we-are/the-seforall-initiative/#:~:text=The%20High%20Impact%20Opportunities%20(HIOs,on%20the%20objectives%20of%20SEforALL.> accessed 9 May 2025

enacting legislation to restructure the power sector, (3) creating and enforcing policies to attract private investment and foster sector development, and (4) regularly monitoring the progress of the plan.

Nigeria can learn from Kenya's renewable energy policies by adopting feed-in tariffs, tax relief, investment guarantees, and net-metering to attract investors and expand its sector. Ensuring transparency, regulatory improvements, and government credibility will build investor confidence, positioning Nigeria as a stable and competitive player in the global renewable energy market.

3. LEGAL FRAMEWORK ON RENEWABLE ENERGY

International Legal framework

United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC entered into force on 21 March 1994. It is an international treaty adopted under the United Nations Conference on Environment and Development. This Convention has been ratified by 198 countries, these countries are called Parties to the Convention. One of the main factors driving the switch to renewable energy sources is climate change, which is addressed in large part by the UNFCCC. The ultimate objective of the Convention is to stabilise greenhouse gas concentrations at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system. It states that such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.[46] The UNFCCC is very instrumental to Nigeria especially in the light of the nation's abundant renewable resources and the demand for sustainable energy sources. All member states are to take into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances.[47] Additionally, it provides funding to developing nations so they can assist adaptation measures to climate change. Industrialised

[46] Article 2 UNFCCC
[47] Article 4 UNFCCC

and developed countries are expected to do more in cutting down emissions on their home ground. These industrialised nations are called Annex I countries and belong to the Organisation for Economic Cooperation and Development (OECD). They include 12 countries with economies in transition from Central and Eastern Europe, many of these countries have taken strong action to do so, and some have already succeeded.[48]

The United Nations Framework Convention on Climate Change (UNFCCC) presents several shortcomings in facilitating energy transition in Sub-Saharan Africa (SSA). Its one-size-fits-all approach overlooks the region's developmental disparities and urgent need for energy access, despite SSA contributing minimally to global emissions.[49] The Convention's mechanisms prioritize mitigation over energy poverty, which affects over 600 million people in SSA.[50] Climate finance provisions under the UNFCCC remain inadequate and inaccessible due to complex bureaucracies and institutional limitations.[51] Furthermore, technology transfer mechanisms are weak, constrained by intellectual property rights and insufficient capacity-building.[52] African states also face marginalisation in global negotiations, limiting their influence on policy direction.[53] Crucially, the Convention lacks a robust just transition

[48] 'What is the United Nations Framework Convention on Climate Change?' https://unfccc.int/process-and-meetings/what-is-the-united-nations-framework-convention-on-climate-change accessed 6 March 2025

[49] Patrick Bond, 'Climate Justice Politics across Space and Scale' (2010) 53(3) Development 343.

[50] Peter Newell and Harriet Bulkeley, 'Landscape for Change? International Climate Policy and Energy Transitions in the Global South' (2017) 35 Energy Research & Social Science 146.

[51] Liane Schalatek and Charlene Watson, *The Global Climate Finance Architecture* (Heinrich Böll Stiftung and ODI Briefing Paper, 2019).

[52] Chukwumerije Okereke and Peter Coventry, 'Climate Justice and the International Regime: Before, During, and After Paris' (2016) 7(6) Wiley Interdisciplinary Reviews: Climate Change 834.

[53] David Ciplet, J Timmons Roberts and Mizan Khan, *Power in a Warming World: The New Global Politics of Climate Change and the Remaking of Environmental Inequality* (MIT Press 2015).

framework to address social and economic implications of shifting from fossil fuels, undermining equitable energy transformation in the region.[54]

The Paris Agreement 2015

It is a legal treaty adopted by 196 countries at the climate change conference in Paris in 2015. The main objective of the agreement is to cut global greenhouse gases in order to limit global temperature increases. It focuses on adaptation, education, financing, technology co-operation, and recognising the role climate action plays in accomplishing many other Sustainable Development Goals.[55] Each nation's contribution to the global climate change plan is outlined in this long-term low emission development strategy thus every country is required to come up with their nationally determined contributions. The Agreement includes clauses that allow developing nations to work toward a green economy. These mechanisms include capacity building, technology sharing, and financial support.[56]

The Paris Agreement 2015, though a landmark in global climate governance, inadequately addresses Sub-Saharan Africa's (SSA) unique energy transition needs. It prioritises mitigation through nationally determined contributions (NDCs), often overlooking structural energy poverty and development disparities in SSA.[57] Limited climate finance access and weak technology transfer further constrain renewable energy adoption.[58] Moreover, the Agreement lacks robust enforcement and does not embed just transition principles vital for fossil-dependent African economies.[59] SSA remains underrepresented in decision-making,

[54] Mark Swilling, Josephine K Musango and Jeremy Wakeford, 'Developmental States and Sustainability Transitions: Prospects of a Just Transition in South Africa' (2016) 18(5) Journal of Environmental Policy & Planning 650.
[55] UNCC, 'The Paris Agreement: What is the Paris Agreement?' https://unfccc.int/process-and-meetings/the-paris-agreement accessed 9 May 2025
[56] Charlotte Streck, 'The Paris Agreement: A New Beginning' (2016) 9 *Journal for European Environment and Planning Law*
[57] Ibid 59
[58] Ibid 58
[59] Ibid 61

perpetuating inequities in global energy governance.[60] These shortcomings hinder SSA's path to equitable, sustainable energy transformation.

National Legal Framework

The 1999 Constitution of the Federal Republic of Nigeria

The Constitution lists electricity generation, transmission and distribution on the Concurrent Legislative List thereby bringing power generation within the confines of the Federal government and the federating units. Part II of Concurrent Legislative List of the Nigerian Constitution provides in paragraph 13 and 14 respectively empowers the National Assembly and State House of Assembly to make laws in relation to electricity generation and distribution in Nigeria thus making it a shared responsibility between the federal and the state government.[61]

The 1999 Constitution of the Federal Republic of Nigeria presents significant challenges to the country's energy transition efforts. Primarily, it centralizes control over energy resources, granting the federal government exclusive authority over electricity generation, transmission, and distribution, which constrains state-level innovation and localised renewable energy deployment.[62] Furthermore, the Constitution lacks explicit provisions promoting renewable energy or environmental sustainability, making the legal framework ill-equipped to support a low-carbon transition.[63] This legal gap contributes to policy inconsistencies and overlapping regulatory mandates, creating uncertainty for investors.[64] Additionally, the constitutional silence on decentralised energy

[60] Ibid 60

[61] Concurrent Legislative Lists, Second Schedule to the Constitution of the Federal Republic Of Nigeria 1999 as
amended

[62] Norbert Edomah, 'The Governance of Energy Transition: Lessons from the Nigerian Electricity Sector' (2021) 11 Energy, Sustainability and Society 40 https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-021-00317-1 accessed 11th May, 2025.

[63] P Onus and others, 'Challenges and Opportunities in Nigeria's Renewable Energy Policy and Legislation' (2024) 23 World Journal of Advanced Research and Reviews 2354–2372 https://doi.org/10.30574/wjarr.2024.23.2.2391 accessed 11 May 202

[64] Iteoluwakiisi Akinwole, 'The Impact of the Global Energy Transition on Nigeria's Electricity Sector' (2022) SSRN https://ssrn.com/abstract=4284681 accessed 11 May 2025

governance undermines the effectiveness of recent reforms such as the Electricity Act 2023.[65] To accelerate energy transition, constitutional reform is necessary to decentralise energy governance and integrate sustainability principles into Nigeria's supreme legal framework.

Electricity Act 2023

The Electricity Act 2023 (EA 2023) was signed into law by the President of the Federal Republic of Nigeria, President Bola Ahmed Tinubu on the 9th June 2023, repealing the Electric Power Sector Reform Act (EPSRA).2005.[66] The Act seeks to simplify and modernise the regulations controlling Nigeria's electricity industry. The electricity industry's changing needs are addressed by this significant law, emphasising greater grid resilience, increased incorporation of renewable energy and stronger consumer protection. The Act establishes the foundation for the use of sustainable environmental friendly practices in electricity and renewable energy.[67] According to the Act, the commission must encourage the growth and use of renewable energy and implement the actions that will boost the contribution of Nigeria's energy blend using renewable energy.[68] The Act also encourages the creation of National Renewable Energy Policy which will set the pace for the usage of wind, solar, hydro and other clean energy technologies. It will also enhance the country's energy sector migration to clean energy sources that is affordable, available and environmentally friendly.[69] The Act also promotes renewable energy production, procurement and distribution responsibilities for Generation Companies (GENCOs) and Distribution Companies (DISCOs) under the NESI.[70]

[65] 'An Appraisal of the Legal Frameworks and Policy Shift in the Nigerian Electricity Sector' (2023) *Nigerian Energy Policy and Law Journal* https://neptjournal.com/upload-images/%2851%29D-1571.pdf.
[66] KPMG, 'Commentaries on the Electricity Act, 2023' https://home.kpmg/ng accessed 15 March 2025
[67] Section 164-171 Electricity Act 2023
[68] Ibid, section 164.
[69] Ibid, section 15
[70] Section 80,81 AND 113 (1) Electricity Act

The Electricity Act 2023 marks a significant step towards decentralizing Nigeria's power sector and promoting renewable energy. However, its implementation presents several challenges that may hinder the country's energy transition. Firstly, the Act's provision for state-level regulation could lead to a fragmented regulatory environment, potentially resulting in multiple licensing requirements and increased operational costs for investors operating across different states. Secondly, while the Act emphasizes renewable energy development, its focus is predominantly on rural areas, leaving urban centers underrepresented in renewable energy initiatives. Additionally, the lack of clear guidelines for implementing the National Integrated Electricity Policy and Strategic Implementation Plan (NIEPSIP) may cause conflicts between federal and state policies, further complicating the regulatory landscape. Moreover, the absence of robust monitoring and evaluation mechanisms raises concerns about the effective deployment of funds and the achievement of intended outcomes.[71] These shortcomings underscore the need for a cohesive and well-coordinated approach to ensure the Act's objectives are met and to facilitate a successful energy transition in Nigeria.

The National Renewable Energy and Energy Efficiency Policy 2015

The Federal Executive Council (FEC) approved the NREEEP as a policy document in April 2015. The policy's specific goal is to provide a framework for action to solve issues that Nigerians confront, such as universal access to clean, modern energy resources, increased energy security, and climate goals. Furthermore, by offering recommendations for the creation, management, upkeep and improvement of both new and current renewable electricity generation plants, it acknowledges the significance of these operations.[72] The NREEEP provides an avenue for creating renewable energy in Nigeria, it is a vital tool to help Nigeria achieve sustainable development, economic growth and energy security.

[71] Idowu Oyebanjo, 'A SWOT ANALYSIS OF THE RECENT AMENDMENT TO THE ELECTRICITY ACT 2023' (The Nigerian Power Sector, 2024) https://nigerianpowersystem.wordpress.com/2024/02/10/a-swot-analysis-of-the-recent-amendment-to-the-electricity-act-2023/ accessed 11 May 2025

[72] Wolemi Esan, 'Renewable Energy in Nigeria: Law, Regulations, Trends and Opportunities' (International Bar Association, 2021) https://www.ibanet.org/renewable-energy-nigeria accessed 16 March 2025

There is also a timeline for the achievement of the implementation of the policy.[73]

The National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015 was designed to guide Nigeria's transition to sustainable energy. However, its implementation has faced significant challenges. A primary issue is the absence of a comprehensive legal framework, leading to regulatory overlaps and institutional inefficiencies. Multiple agencies with overlapping mandates have caused confusion and hindered effective policy execution.[74] Additionally, the lack of clear enforcement mechanisms and dedicated institutions for policy review and implementation has stalled progress.[75] Financial constraints, including high taxation rates and limited access to funding, have further impeded renewable energy investments.[76] Moreover, bureaucratic hurdles and inconsistent policy applications have discouraged both local and foreign investors.[77] To overcome these shortcomings, Nigeria must establish a coherent legal framework, streamline institutional roles, and create conducive financial environments to foster renewable energy development.

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[73] OV Ojo, 'An Overview of the Legal and Regulatory Framework for Renewable Energy Projects in Nigeria: Challenges and Prospects' (2017) 1(35) Unilag Law Review 22–47

[74] P Onus, J Ejiga, E Abah, J Onuh, I Christian, J Omale, 'Challenges and Opportunities in Nigeria's Renewable Energy Policy and Legislation' (2024) 23 Journal of Advanced Research 2354-2372 https://doi.org/10.30574/wjarr.2024.23.2.2391 accessed 9th May, 2025.

[75] Bem Ayangeaor, 'Review of Nigeria's National Renewable Energy and Energy Efficiency Policy' (2022) ResearchGate https://www.researchgate.net/publication/361109456_REVIEW_OF_NIGERIA%27S_NATIONAL_RENEWABLE_ENERGY_AND_ENERGY_EFFICIENCY_POLICY. Accessed 11th May, 2025.

[76] Kenneth Odo, 'A Systematic Review on the Renewable Energy Development, Policies and Challenges in Nigeria with an International Perspective and Public Opinions' (2021) International Journal of Renewable Energy Development https://doi.org/10.14710/IJRED.2022.40359 accessed 9 May 2025

[77] Aisha T. Ajia, 'Policy Challenges and Opportunities for Renewable Energy Development in Nigeria: A Systematic Review' (2025) 18(1) African Journal of Environmental Sciences and Renewable Energy 115 https://doi.org/10.62154/ajesre.2025.018.010660 accessed 11th May, 2025

The Nigerian Electricity Regulatory Commission's (NERC) Renewable Energy Feed in Tariffs (REFIT) Regulation 2015

The NERC Renewable Energy Feed-In-Tariff Regulations 2015 was established by NERC to feed-in tariff for renewable energy generation in Nigeria as well as the enhancement of investments in renewable energy in the country. Nigeria is required under the tariff to produce at least 1000MW from renewable sources. Furthermore, the regulations require power distribution companies to obtain a minimum of 50 percent of their entire supply from renewable energy sources.[78] The NERC Renewable Energy Feed-in-Tariffs Regulation 2015 enumerates various crucial requirement to aid the growth of renewable sector in the Nigerian Economy and these includes guaranteed purchase agreements, tariff rates, grid integration and streamlined licensing.[79]

The NERC Renewable Energy Feed-in Tariffs (REFIT) Regulation 2015 aimed to incentivise renewable energy investments.[80] However, its effectiveness is limited by several factors. The regulation applies only to grid-connected projects with capacities between 1 MW and 30 MW, excluding off-grid and larger-scale projects.[81] This narrow scope restricts the potential for widespread renewable energy adoption. Additionally, the requirement for developers to bear the costs of grid connection and infrastructure upgrades imposes significant financial burdens, deterring investment. The absence of a comprehensive framework for net metering and competitive bidding further complicates the regulatory landscape, leading to inconsistent tariff applications and

[78] LSE, 'Regulations On Feed-In-Tariff For Renewable Energy Sourced Electricity In Nigeria [2015]' *Climate Change Laws of the World, Graham Research Institute on Climate Change and Environment* https://climate-laws.org/document/regulations-on-feed-in-tariff-for-renewable-energy-sourced-electricity-innigeria-2015_a7ba accessed on 30 March 2025

[79] Ibid

[80] Edoja Rufus Akpodiete, 'Regulation of Renewable Energy Tariff in the Nigerian Electricity Supply Industry' (2023) https://pgsds.ictp.it/xmlui/handle/123456789/2103 accessed 11 May 2025

[81] 'Renewable Energy in Nigeria: Law, Regulation, Trends and Opportunities' (2021) International Bar Association https://www.ibanet.org/renewable-energy-nigeria accessed 11 May 2025.

project delays.[82] These shortcomings hinder the realisation of Nigeria's renewable energy potential and impede progress towards a sustainable energy future.

National Energy Policy 2003

The National Energy Policy was ratified in 2003 with the objective to ensure the development of the energy sector in Nigeria through the use of various energy alternatives which will enhance effective energy outcome and energy security which in turn increases consumption and ensures affordable energy across Nigeria.[83] The policy emphasises the advancement, utilisation and promotion of Nigeria's renewable energy source including all options into national energy composition especially in rural areas. The NEP outlines major policies in respect of renewable energy, this includes; ascertaining sustainable energy sources, encouraging research and development with public, private and local participation, avoiding the excessive use of high-carbon energy sources as well as the creation of comprehensive energy planning system.[84]

The Environmental Impact Assessment Act 1992

The goals and objectives of the Act as provided by the Act include the following; To establish, before a decision is taken by a person, authority or corporate body or unincorporated body including the Government of the Federation, State or Local Government intending to undertake or authorise the undertaking of any activity, those matters that may likely or to a significant extent affect the environment or have an environmental effect of those activities which shall first be taken into account. To promote the implementation of appropriate policy in all Federal lands, State or Federal Government areas, consistent with all laws and decision-making processes through which the goal and objective in

[82] A Lawal-Arowolo and T Douglas, 'Electricity Generation and Renewable Energy Policy in Nigeria: Resolving the Regulatory Challenges' (2022) 1 American Journal of Environment and Climate 42–53 https://doi.org/10.54536/ajec.v1i1.258 accessed 11 May 2025

[83] SO Daudu and SO Idehen, 'An Examination of the Implementation of Existing Policies on Renewable Energy in Nigeria: How Effective?' (2021) 9(5) Journal of Power and Energy Engineering

[84] Energy Commission of Nigeria, Abuja, Federal Republic of Nigeria.

paragraph (a) will be realised. To encourage the development of procedures for information exchange, notification, and consultation between organs and persons when proposed, activities that are likely to have significant environmental effects and boundary or trans-state or on the environment of bordering towns and villages.[85]

The law that governs EIA practice in Nigeria as adopted in 1992 is the main document explaining the system and principles of EIA in Nigeria. It is particularly directed at regulating the industrialisation process with due regard to the environment. By this Act, no industrial plan, development, activity can be executed without prior consideration of the environmental consequences of such a proposed action, in the form of an environmental impact assessment[86]

The Environmental Impact Assessment (EIA) Act 1992 is a critical environmental regulatory tool in Nigeria, yet it exhibits notable shortcomings in facilitating energy transition. Firstly, the Act does not explicitly incorporate climate change or renewable energy considerations, making it poorly aligned with Nigeria's sustainability goals.[87] Secondly, enforcement is weak, with insufficient institutional capacity and political will, leading to inadequate monitoring of compliance.[88] Moreover, the lack of transparency and limited public participation undermine environmental justice and stakeholder trust.[89] These deficiencies limit the Act's effectiveness in guiding low-carbon energy development. A

[85] Section 1, Environmental Impact Assessment Act

[86] Nerry Echefu and E Akpofure, 'Environmental Impact Assessment in Nigeria: Regulatory Background and Procedural Framework' UNEP EIA Training Resource Manual 63

[87] O Eni and others, 'Mapping the Weaknesses of Nigeria's Environmental Impact Assessment Mechanism as a Framework for Environmental Justice in the Petroleum Sector' (2024) 28(1) Human Ecology Review 7 https://www.researchgate.net/publication/384290648 accessed 11 May 2025

[88] Charles Nwoko, 'A Review of Historical Development of Environmental Impact Assessment in Nigeria' (2013) Global Journal of Environmental Science and Technology https://www.gjournals.org/GJEST accessed 11 May 2025

[89] 'Environmental Impact Assessments Don't Work in Nigeria: Here's Why' (2022) *Zawya* https://www.zawya.com/en/economy/africa/environmental-impact-assessments-dont-work-in-nigeria-heres-why-xvp7s7bi accessed 11th May, 2025

comprehensive reform is necessary to align the EIA framework with global climate and energy transition standards.[90]

The Energy Commission of Nigeria Act 1979

The Energy Commission of Nigeria Act provides the legal framework for the creation of the Energy Commission of Nigeria to conduct research on alternative energy sources and it is also responsible for the planning and coordination of energy policies in Nigeria. The Act states the functions of the commission as it relates to its structure and other roles.[91] The Act provides for the formulation of policies, promotion of energy research and development, safeguarding energy resources, collaborating with stakeholders in the energy sector, advising the government as well as promotion of energy conservation.[92]

The Energy Commission of Nigeria Act 1979 lacks clear mandates for renewable energy and sustainability, limiting its relevance to modern energy transition goals. Its outdated framework, weak enforcement, and institutional overlaps hinder effective coordination and investment in clean energy, necessitating urgent reform to align with Nigeria's climate and energy targets.[93]

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[90] 'Environmental Impact Assessment in Nigeria' (2024) *Novatia Consulting* https://novatiaconsulting.com/environmental-impact-assessment-in-nigeria/ accessed 11th May, 2025

[91] Section 1, Energy Commission of Nigeria Act

[92] Section 3, Energy Commission of Nigeria Act

[93] 'An Institutional Framework for Energy Transitions' (2023) *ScienceDirect* https://www.sciencedirect.com/science/article/abs/pii/S2214629623000543 accessed 11 May 2025.

'Reviewing the Legal Framework for Renewable Energy Projects in Nigeria' (2023) *Business Day* https://businessday.ng/news/legal-business/article/reviewing-the-legal-framework-for-renewable-energy-projects-in-nigeria/ accessed 11 May 2025.

4. INSTITUTIONAL FRAMEWORK: ROLES OF GOVERNMENT AGENCIES AND REGULATORY BODIES.

The International Energy Agency was created in 1974. The IEA's main purpose is to help in the coordination of collective response to major disruptions in the supply of energy, promotion of clean energy transitions, provision of reliable and affordable energy. Other functions include to promote energy security, encourage international collaboration and governance, energy security and energy data and statistics analysis, policy recommendations and practical solutions to assist nations in providing safe and sustainable energy for all. The IEA is at the centre of the global energy conversation. The IEA has evolved and expanded significantly since its foundation, the IEA suggests policies that improve energy's affordability, sustainability, and dependability.

The IEA has been welcoming key emerging nations since 2015 in an effort to increase its worldwide influence and strengthen collaboration in the areas of energy security, data and statistics, energy policy analysis, energy efficiency, and the expanding use of clean energy technology. The IEA further makes recommendations for expansion of renewable energy making projections till the year 2030 by also tracking past years growth[94]

The Federal Ministry of Power

The Federal Ministry of Power serves as the executive arm of the Federal Government saddled with the responsibility of providing power in the country.[95] As the administrative branch of the Federal Government overseeing the power sector, the Ministry of Power continues to organise various agencies to execute the ministry's policy objectives. It is the function of the Federal Ministry of Power to implement Renewable

[94] Renewables https://www.iea.org/energy-system/renewables accessed on 8 March 2025
[95] About Federal Ministry of Power, < https://www.power.gov.ng/about-nigeria-federal-ministry-of-power/>
accessed on 9 March 2025.

Energy events and initiatives.[96] Among its numerous functions is the duty of the Ministry to initiate and formulate a wide range of policies and programmes towards the development of power sector as well as handling policy matters that border on research and development of the power sector[97]. The Federal Ministry of Power faces significant challenges in advancing Nigeria's energy transition. Its centralized governance structure limits state-level innovation and the integration of decentralized renewable energy solutions. Persistent issues such as inadequate infrastructure, policy inconsistency, and bureaucratic inefficiencies further hinder progress. Moreover, the ministry's limited capacity to attract investment and enforce reforms exacerbates the slow pace of adopting clean energy technologies.[98]

The Nigerian Electricity Regulatory Commission

The Nigerian Electricity Regulatory Commission (NERC) has a major function of ensuring that users have access to power supply. As part of the power granted the NERC, several regulations have been formulated to enhance renewable power supply. This is with the specific focus on promoting clean electricity generation and delivery. Notable among these regulations are the Nigerian Electricity Regulation 2012, the Mini-grid Regulations 2017, and the Renewable Energy Feed-in-Tariff Regulations 2015[99].

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[96] Functions Federal Ministry of Power, < https://www.power.gov.ng/functions-nigeria-federal-ministry-of-power/> accessed on 9 March 2025

[97] ibid

[98] Norbert Edomah, 'The Governance of Energy Transition: Lessons from the Nigerian Electricity Sector' (2021) 11 Energy, Sustainability and Society 40 https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-021-00317-1 accessed 11 May 2025. Isah Samaila Nitte and Tope Muslihudeen Salahuddeen, 'Energy Transitions in Nigeria: The Role of Policies for the Adoption of Low-Carbon Technologies and System Integration' (2022) EPRA International Journal of Research and Development https://doi.org/10.36713/epra12666 accessed 11 May 2025.

[99] Israel Aye and others, 'The Renewable Energy Law Review: Nigeria' (The Law Reviews, 10 August 2021) https://thelawreviews.co.uk/title/the-renewable-energy-lawreview/nigeria cited in Oluwatosin Selomeh Ogunlana and Markanthony Ezeoha, 'The Future Of Renewable Energy In Nigeria: Charting The Path For Renewable Energy In Nigeria' (2021) *SSRN* https://ssrn.com/abstract=3960313 accessed 16 May 2025

The Federal Ministry of Environment

The Federal Ministry of Environment is the ministry that is in charge of ensuring the safety Nigeria's natural resources for future generations and it defends the environment against pollution and destruction. Through the Department of Climate Change, the ministry manages all actions pertaining to climate change. The department's primary goal is to promote renewable energy and energy efficiency; consequently, it emphasises the sustainable use of biomass for cooking and agricultural purposes. The Federal of Environment through the Environmental and Social Impact Assessment (ESIA) carries out activities to ensure good developmental projects. There is an overlap in functions between the National Climate Council (NCCC) and the FME under the Climate Change Act 2021 which has led to concerns about potential duplicity and bureaucratic inefficiencies. For instance, both entities are involved in policy formulation and implementation, which can result in conflicting directives and hinder effective climate action.[100] To address these challenges, it is crucial to delineate clear roles and foster collaboration between the NCCC and the FME, ensuring a cohesive approach to Nigeria's energy transition and climate change mitigation efforts.

The Federal Ministry of Environment plays a pivotal role in Nigeria's energy transition; however, it faces several challenges that hinder its effectiveness. These include limited institutional capacity, inadequate funding, and overlapping mandates with other agencies, leading to policy inconsistencies and implementation gaps. Furthermore, while the FME has initiated programs like the Renewable Energy Programme to promote clean energy, the lack of a cohesive and enforceable legal framework hampers progress. To accelerate Nigeria's energy transition, it is imperative to strengthen the FME's institutional capacity, ensure adequate

[100] E Woha and C Brown, 'An Evaluative Discourse on the Prospects of Nigeria Achieving the Net-Zero Carbon Emissions: A Focus on the Climate Change Act, 2021' (2023) 13 *African Journal of Law & Criminology (AJLC)* 254 https://www.researchgate.net/publication/378316402_AN_EVALUATIVE_DISCOURSE_ON_THE_PROSPECTS_OF_NIGERIA_ACHIEVING_THE_NET-ZERO_CARBON_EMISSIONS_A_FOCUS_ON_THE_CLIMATE_CHANGE_ACT_2021 accessed 11 May 2025

funding, and establish clear, enforceable policies that align with national and international climate goals.[101]

The Rural Electrification Agency

The REA duties include the utilization of renewable energy resources for local communities. It is the agency's responsibility to establish a framework for the growth and application of renewable energy sources, fostering an atmosphere that will draw investment to rural regions. Additionally, it encourages the efficient use of renewable energy, supply diversification to protect energy sources, and increased access to electricity through diverse renewable energy and rural electrification technologies. Furthermore, the agency is in charge of implementing bio-energy technology for rural electrification, as well as public education campaigns for renewable energy production and use[102].

The Rural Electrification Agency (REA) plays a pivotal role in Nigeria's energy transition, particularly in expanding access to electricity in underserved rural areas. However, several shortcomings hinder its effectiveness. Firstly, the REA faces significant funding constraints, with estimates indicating that Nigeria requires approximately $410 billion to fully transition to clean energy and at least $40 billion to close its electricity access gap.[103] Secondly, there is a lack of adequate training, education, and certification programs, leading to a shortage of skilled and qualified workers necessary for designing, installing, operating, and maintaining renewable energy systems.[104] Furthermore, the high initial costs of low-carbon technologies, particularly in rural regions, have

[101] 'Challenges of Climate Change, Energy Transition Require Innovative Solutions – Minister' (2024) *EnviroNews Nigeria* https://www.environewsnigeria.com/challenges-of-climate-change-energy-transition-require-innovative-solutions-minister/ accessed 11 May 2025

[102] Section 128(f)(i)-(vi) of the Electricity Act 2023

[103] Iseoluwa Asaolu, 'REA, LPV Technologies' Role in Nigeria's Energy Transition' (The Electricity Hub, 2025) https://theelectricityhub.com/rea-lpv-technologies-role-in-nigerias-energy-transition/ accessed 11 May 2025

[104] SAO Energy, 'Opportunities and Challenges in Navigating Nigeria's Energy Transition' https://saoenergy.com/opportunities-and-challenges-in-navigating-nigerias-energy-transition/ accessed 11 May 2025

hampered their development, despite the government's implementation of several programmes and plans to address this issue.[105] These challenges underscore the need for increased investment, capacity building, and policy reforms to enhance the REA's role in Nigeria's energy transition.

The Nigeria Bulk Electricity Trader

The Nigerian Bulk Electricity Trading Plc, a public liability company owned by the Federal Government of Nigeria, serves as a catalyst for the development of an effective and competitive wholesale electricity market. It achieves this by purchasing substantial amounts of electricity and ancillary services from Independent Power Producers (IPPs) and successor Generation Companies (GENCOS). The acquired electricity is then resold to Distribution Companies (DISCOS) and other large consumers. The Nigerian Electricity Regulatory Commission gives a license to the Nigerian Bulk electrical Trader, permitting it to bulk purchase electricity and participate in resale or contracts with power distribution companies and other electrical market operators for distribution throughout Nigeria.[106]

Nigeria Bulk Electricity Trader is committed to achieving energy diversification to include electricity from renewable energy sources in the nation's energy mix. In 2016, Nigeria Bulk Electricity Trader signed power purchase agreements with some GenCos for the generation of 1GW of electricity from solar photovoltaic (PV).[107] The weak creditworthiness, opaque procurement, and focus on conventional power hinder investment in renewables and delay Nigeria's energy transition.

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[105] Samaila Isah and Tope Salahudeen, 'Energy Transitions in Nigeria: The Role of Policies for the Adoption of Low-Carbon Technologies and System Integration' (2023) 8 EPRA International Journal of Research & Development (IJRD) 128 https://doi.org/10.36713/epra12666 accessed 11 May 2025

[106] Kamoru Lawal, 'The Role Of Legislation In Ensuring Sustainable Energy Development In Nigeria: Lesson From Kenya' (Mphil Thesis, University Of Adelaide, Australia 2020) https://www.academia.edu/90906047/The_Role_of_Legislation_in_Ensuring_Sustainable_Energy_Development_in_Nigeria_Lessons_from_Kenya accessed on 15 March 2025

[107] Ibid

The Energy Commission of Nigeria

The Energy Commission of Nigeria (ECN) was established in 1979, and its act was amended 1988 and 1989 and it was given the statutory mandate for the strategic planning and co-ordination of national policies in the field of Energy in all its ramifications. The Energy Commission of Nigeria established by the Energy Commission of Nigeria Act, 1979. The Minister in charge of Power and Steel is mandatorily a member of the Energy Commission of Nigeria.[108]

According to its mandate, the ECN is the highest government agency with the authority to implement policies and plan the energy sector overall, encourage the diversification of energy resources by developing and making the best use of all, including the introduction of new and alternative energy resources like solar, wind, biomass and nuclear energy[109] The body is charged with the responsibility for the strategic planning and coordination of national policies in the field of energy in all its ramifications. This is accomplished by researching and advising the state or federal government on sufficient funding for the energy sector, including research and development, production, and distribution, as well as by keeping an eye on how well the energy sector is performing in carrying out government energy policies. An additional function of the Nigerian Energy Commission is to collect and distribute data about national energy policy.[110]

4.1 Challenges of Renewable Energy Adoption in Nigeria

Financial Constraints

Financial factors are a significant barrier to Nigeria's adoption of renewable energy. Nigeria struggles with lack of locally manufactured energy infrastructure or facilities, parts, and equipment needed for renewable energy projects. These are imported, leading to high capital costs for installation and procurement. Additionally, the country faces

[108] *Energy Commission of Nigeria Act*
[109] Devex, 'Energy Commission of Nigeria (ECN)' https://www.devex.com/organizations/energy-commissionof-nigeria-ecn-150225 accessed on 9 March 2025
[110] ibid

limited access to financing for renewable energy projects, as well as a lack of investment incentives to attract both local and international investors.[111] Despite some progress in renewable energy investments, particularly in solar power, the total funding secured so far has not been sufficient to meet the nation's renewable energy infrastructure needs.

Infrastructural Limitations

The lack of adequate infrastructure and technology to support the development of renewable energy resources also presents a significant challenge to their implementation and use in Nigeria.[112] Although, Nigeria is blessed with year-round sunshine and abundant minerals such as silicate, lithium, lead, tin, zinc, and cobalt key materials for making solar panels and batteries the country does not produce solar panels, batteries, or other components used in solar energy systems, apart from cables. Due to the high costs of solar energy installation, driven by the absence of local production of these essential components, few people can afford to install solar power as either a primary or backup energy source. Moreover, Nigeria's underdeveloped power transmission and distribution networks further hinder the effective delivery of electricity, including renewable energy, across the country. The lack of infrastructure for the exploitation of wind and tidal energy, along with the inadequate technological capacity to utilise renewable resources efficiently, means that Nigeria is not fully tapping into its diverse energy potential. As a result, various renewable energy sources remain underused for power generation. Overcoming these challenges will require substantial regulations, investments, and the development of infrastructure to close the technological and physical gaps, enabling Nigeria to fully harness its renewable energy potential.

Policy and Regulatory Frameworks

Nigeria's efforts to diversify its energy mix led to the creation of the Renewable Energy Master Plan (REMP), initially approved in November

[111] HN Amadi, 'Renewable Energy in Nigeria: Prospects and Challenges' (2024) < https://www.researchgate.net/publication/380147954_Renewable_Energy_in_Nigeria_Prospects_and_Challenges> accessed March 13 2025
[112] ibid

2005 and revised in 2011[113]. Developed through a partnership between the United Nations Development Programme (UNDP) and the Energy Commission of Nigeria (ECN), REMP outlines a broad vision, objectives, and an action plan to address the country's major energy challenges by promoting the rapid development and utilisation of renewable energy sources. REMP offers a comprehensive framework for formulating policies, enacting laws, technology, human resources, infrastructure, and markets for renewable energy, and sets clear, measurable national targets for the short, medium, and long term. These targets were categorised into short-term (2007), medium-term (2015), and long-term (2025). The implementation of REMP must also align with Nigeria's broader sustainable development goals as laid out in national policy documents such as Nigeria Vision 2020, the National Adaptation Strategy and Plan of Action on Climate Change (NASPA-CCN) for Nigeria, and the National Adaptation Strategy and Climate Change Action Plan for Nigeria. The plan aims to boost the demand for renewable energy and support the country's shift from a crude oil-dependent economy to one that is more carbon-efficient. However, over a decade after the launch of REMP, progress has been limited. While hydroelectric power plants have been developed, there has been minimal advancement in other renewable energy sectors, and no significant increase in electricity generation from renewable sources on the national grid.. A major factor contributing to this stagnation is the inconsistency in renewable energy policies, which has led to confusion and delays in implementation. Additionally, legal and institutional barriers such as unclear regulatory frameworks, lack of coordination among stakeholders, and weak enforcement of policies have hindered the effective execution of REMP, limiting the growth of renewable energy in the country.[114]

Socio-Economic and Political Barriers

The development of Nigeria's renewable energy sector has been significantly hindered by a range of socio-economic and political challenges. These barriers not only impede the country's ability to tap into

[113] HN Amadi, MC Madu, OE Ojuka and ON Igbogidi, 'Renewable Energy in Nigeria: Prospects and Challenges' (2024) 11(4) European Journal of Advances in Engineering and Technology https://ejaet.com/PDF/11-4/EJAET-11-4-51-60.pdf accessed 13 March 2025
[114] Ibid.

its vast renewable energy resources but also prevent the successful implementation of strategic plans such as the Renewable Energy Master Plan (REMP). The key socio-economic and political obstacles include political and policy challenges, market distortions, environmental concerns, and issues surrounding public perception and government commitment.[115] Despite well-intentioned efforts, government policies to promote renewable energy often face delays or are not fully executed due to political factors. These policy gaps and the lack of consistent enforcement hinder the progress of renewable energy initiatives, delaying their integration into Nigeria's energy mix. Furthermore, political instability and shifting priorities can disrupt long-term energy plans, making it difficult for renewable energy to thrive. Public perception and acceptance of renewable energy are additional barriers.[116] Many Nigerians are still skeptical about the reliability and affordability of renewable energy systems. This skepticism is often driven by a lack of understanding about how renewable energy works and its long-term benefits. As a result, the public may be reluctant to adopt renewable energy technologies, particularly if they are seen as costly or unreliable compared to traditional energy sources.

Also, the government's commitment and political will are critical to overcoming these barriers. While there have been various policy frameworks and initiatives, inconsistent political support and a lack of funding have undermined their success. Without strong political backing and accountability, efforts to promote renewable energy will continue to encounter obstacles. A clear, sustained commitment from the government is necessary to ensure the successful implementation of policies and projects that can drive the country towards a more sustainable energy future.[117]

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[115] Ibid.

[116] Peter Onuh, OE James, OA Emmanuel, OO Joy, 'Challenges and Opportunities in Nigeria's Renewable Energy Policy and Legislation' (2024) *Journal of Advanced Research* https://www.researchgate.net/publication/383661742_Challenges_and_Opportunities_in_Nigeria's_Renewable_Energy_Policy_and_Legislation accessed 13 March 2025

[117] Michael Peter, 'Barriers to renewable Energy Adoption In Nigeria' (2023) https://www.linkedin.com/pulse/barriers-renewable-energy-adoption-nigeria-michael-peter accessed 13 March 2025

5. SUMMARY OF KEY FINDINGS: OPPORTUNITIES FOR ENHANCING NIGERIA'S RENEWABLE ENERGY TRANSITION

Strengthening policy and regulatory frameworks is crucial for Nigeria's renewable energy transition. The existing policies, though progressive, require harmonisation and stricter enforcement to eliminate regulatory uncertainties that deter investment. A clear legal framework with incentives for renewable energy development, such as tax breaks and feed-in tariffs, can accelerate deployment. Institutional capacity building and governance improvements are essential to ensure effective implementation of renewable energy policies. Government agencies must be adequately resourced and equipped to oversee compliance, facilitate private sector participation, and streamline bureaucratic processes. Transparency and accountability mechanisms should also be enhanced to mitigate corruption and inefficiencies.

Innovative financing mechanisms can bridge the funding gap in renewable energy projects. Green bonds, public-private partnerships, and concessional loans can attract local and international investors. Establishing a dedicated green investment fund will further de-risk investments and support project development. International collaboration and technology transfer can drive Nigeria's renewable energy sector forward. Strategic partnerships with global institutions can facilitate knowledge exchange, capacity building, and access to cutting-edge technologies. Leveraging Nigeria's participation in climate agreements and bilateral trade pacts will enhance resource mobilization and technological advancement. By addressing these areas, Nigeria can create an enabling environment for a just and accelerated transition towards a sustainable energy future.

6. RECOMMENDATIONS FOR A SUSTAINABLE ENERGY FUTURE

Achieving a sustainable energy future in Nigeria requires a multi-faceted approach that integrates policy reforms, financial and infrastructural solutions, and active stakeholder engagement. Addressing these critical areas will enable the country to transition towards a cleaner,

more reliable energy system that supports economic development and environmental sustainability. Policy reforms and legal improvements are fundamental to fostering a conducive environment for renewable energy investment and development. The government must establish a comprehensive and cohesive legal framework that aligns national energy policies with global best practices. A more consistent regulatory landscape will enhance investor confidence and eliminate bureaucratic bottlenecks that hinder project implementation. Strengthening enforcement mechanisms and incentivizing compliance through tax benefits, feed-in tariffs, and renewable energy quotas will further drive the sector's growth. Additionally, integrating climate and energy policies into national development strategies will ensure long-term sustainability and resilience.

Overcoming financial and infrastructural barriers requires targeted interventions to mobilize capital and expand energy access. Establishing dedicated green investment funds and offering concessional financing options will de-risk renewable energy projects and attract private sector participation. Public-private partnerships (PPPs) can provide the necessary capital and expertise to scale up energy infrastructure while ensuring efficient service delivery. Additionally, leveraging decentralized energy solutions, such as mini-grids and off-grid solar systems, will help address electricity deficits in rural and underserved areas. Strengthening research and development (R&D) initiatives will also facilitate the localization of renewable energy technologies, reducing dependence on costly imports.

A collaborative effort among key stakeholders is essential for sustainable energy transformation. The government must lead policy formulation, provide regulatory oversight, and create an enabling business environment. The private sector, including energy companies, financial institutions, and investors, plays a crucial role in funding and deploying innovative energy solutions. International partners, such as multilateral institutions, development agencies, and foreign investors, can support Nigeria through technology transfer, capacity building, and concessional financing. Strengthening partnerships across these sectors will enhance knowledge-sharing, improve technical expertise, and ensure the effective implementation of renewable energy projects.

By implementing these recommendations, Nigeria can foster a resilient, low-carbon energy system that promotes economic growth,

mitigates climate change, and enhances energy security for future generations.

7. CONCLUSION

Nigeria stands at a critical juncture in its energy transition, where fragmented efforts will only perpetuate existing challenges. A coordinated approach among stakeholders government, private sector, and international partners is essential to overcoming policy inconsistencies, financial constraints, and infrastructural limitations. Without strategic collaboration, the country risks falling behind in the global shift towards renewable energy, jeopardizing both economic growth and environmental sustainability. A sustainable energy future for Nigeria is not an abstract aspiration but a necessity. By implementing robust policy reforms, fostering innovative financing mechanisms, and leveraging international expertise, Nigeria can unlock its vast renewable energy potential. However, the path forward demands political will, strategic investment, and a shared commitment to long-term energy security. If effectively pursued, this transition will not only secure Nigeria's energy future but also position it as a regional leader in sustainable development, ensuring prosperity for generations to come.