

AN APPRAISAL OF SUSTAINABLE ENERGY DEVELOPMENT AND CHALLENGES IN NIGERIA

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Abstract

This paper appraised Sustainable energy development in Nigeria presents both significant opportunities and formidable challenges. The paper found out that Nigeria as one of Africa's largest economies, has a vast array of natural resources, including considerable potential for renewable energy sources such as solar, wind, and biomass. However, despite this potential, the country remained heavily reliant on fossil fuels, particularly oil and natural gas, which account for most of its energy production. This reliance has not only contributed to environmental degradation and climate change but has also created a vulnerable energy sector subject to price volatility and geopolitical instability. The paper adopted the doctrinal method of research with primary sources of law drawn from legislations, while secondary sources were drawn from journal articles and internet sources. The urgent need to transition to a more sustainable energy system is underscored by Nigeria's commitments under international agreements such as the Paris Agreement and the Sustainable Development Goals (SDGs), which call for reductions in greenhouse gas emissions and increased access to clean, reliable energy. The paper revealed that one of the most significant barriers to sustainable energy development in Nigeria is the inadequacy of the existing energy infrastructure. Financial constraints also play a crucial role in hindering the growth of the renewable energy sector in Nigeria. Security challenges, particularly in the Niger Delta region, pose additional risks to energy infrastructure and investment. Frequent vandalism, theft, and insurgent attacks on pipelines and energy facilities disrupt energy supply and increase operational costs. These security issues not only threaten the stability of the energy sector but also discourage the development of renewable energy projects in affected areas. The paper concluded that there is need for a multifaceted approach to overcome these challenges and achieve sustainable energy development in Nigeria, significant investment in infrastructure modernization is essential, particularly in upgrading the national grid to handle the variability of renewable energy sources. The paper recommended amongst others innovative financial mechanisms, such as green bonds and risk-sharing facilities, are recommended to address the financial constraints hindering the sector. Finally, improving security measures around energy infrastructure is crucial for protecting investments and ensuring a stable energy supply.

Keywords: Sustainable, Energy and Development

1.0 Introduction

In recent years, Nigeria has made strides in sustainable energy development, including the adoption of the Renewable Energy Master Plan (REMP) in 2005,¹ which aims to increase the contribution of renewable energy to Nigeria's energy mix. The government has also pursued various initiatives to encourage investment in renewable energy, including the establishment of the Nigerian Electricity Regulatory Commission (NERC)² to regulate and promote a sustainable energy market. The National Energy Policy, 2003 formulated by the Energy Commission of Nigeria, provided a comprehensive framework for the energy sector, promoting the development of renewable energy and ensuring energy

¹ REMP, 2005.

² NERC, inaugurated on 31st October, 2005, by virtue of the Electric Power Sector Reform Act, No. 6, 2005, Cap. E7, L.F.N. 2004, (as amended in 2023).

security. It highlighted the need for energy efficiency, environmental sustainability, and access to modern energy services.

The REMP, 2012 was developed to provide a clear strategy for increasing the use of renewable energy in Nigeria's energy mix.³ It set targets for renewable energy contributions and outlined the necessary legal and regulatory frameworks to support these goals. The EPSRA, 2005 was a landmark law aimed at liberalizing Nigeria's electricity sector. It established the Nigerian Electricity Regulatory Commission (NERC) and unbundled the National Electric Power Authority (NEPA) into different entities to encourage private sector participation in power generation, distribution, and transmission.⁴ The Act also encourages investment in renewable energy sources. NERC has issued several regulations to support sustainable energy, including the Feed-in Tariff (FiT) regulations for renewable energy, which aim to provide a guaranteed price for electricity generated from renewable sources, and the Mini-Grid Regulation, which supports rural electrification through renewable energy.⁵ National Renewable Energy and Energy Efficiency Policy (NREEEP), 2015 was developed to harmonize the efforts of various stakeholders in the energy sector and promote the use of renewable energy and energy efficiency.⁶ It aims to create an enabling environment for the private sector to invest in renewable energy and energy efficiency projects. As a signatory to the Paris Agreement, Nigeria has committed to reducing its greenhouse gas emissions and increasing the use of renewable energy. The country's NDCs outline its climate change mitigation and adaptation strategies, including the expansion of renewable energy capacity.⁷

Energy development in Nigeria during the colonial period was primarily focused on fossil fuels, particularly coal, which was discovered in Enugu in 1909. Coal powered the nation's railways and was a significant export commodity.⁸ Hydropower development also began with small-scale installations. Following Nigeria's independence in 1960, the discovery of crude oil in Oloibiri in 1956 shifted the nation's energy focus. The oil boom of the 1970s made Nigeria one of the world's leading oil producers, but it led to a neglect of other energy sources such as coal and hydropower. This period saw a heavy reliance on oil for revenue, which significantly impacted the diversification of the energy sector.⁹ The 1980s and 1990s witnessed a growing awareness of the need for energy diversification due to the fluctuating prices of oil and its environmental impact.¹⁰ Hydropower gained more attention, and the Nigerian government initiated several projects, including the construction of major dams like the Kainji Dam. However, these efforts were hampered by economic challenges and political instability. The early 21st century marked a renewed push for sustainable energy development. With increasing global awareness of climate change and sustainable development, Nigeria began to explore renewable energy

³ Y Oke, *Nigerian Electricity Law and Practice* (2nd edn Princeton & Associates Publishing Co. 2021) 20-35.

⁴ *Ibid.*

⁵ NREEEP, 2015, ss 1-5.

⁶ *Ibid.*

⁷ *Ibid.*

⁸ Y Oke, *Nigerian Electricity Law and Practice* (2nd edn Princeton & Associates Publishing Co. 2021).

⁹ *Ibid.*

¹⁰ *Ibid.*



sources such as solar, wind, and biomass. The government launched the National Energy Policy in 2003, which emphasized the importance of renewable energy and energy efficiency.¹¹

Nigeria's energy infrastructure is outdated and inadequate, leading to frequent power outages and limiting the capacity to integrate renewable energy sources.¹² The lack of modern grid infrastructure hampers the distribution and transmission of electricity from renewable sources. Although Nigeria has made progress in establishing a legal and regulatory framework for renewable energy, inconsistencies in policy implementation, bureaucratic delays, and regulatory bottlenecks continue to pose challenges. There is also a lack of clarity in some regulations, which discourages investment. Sustainable energy projects in Nigeria often face financing challenges. High upfront costs, limited access to credit, and a lack of incentives for private investors hinder the development of renewable energy projects. Additionally, foreign investors are often wary of the political and economic risks associated with investing in Nigeria.¹³ The security situation in some parts of Nigeria, particularly in the Niger Delta and northeastern regions, poses significant risks to energy infrastructure and deters investment in sustainable energy projects.¹⁴ Vandalism, theft, and insurgency have affected both fossil fuel and renewable energy installations. There is a low level of public awareness and acceptance of renewable energy technologies in Nigeria. Many people are unaware of the benefits of renewable energy, and there is often resistance to adopting new technologies, particularly in rural areas. While renewable energy is generally more environmentally friendly than fossil fuels, some renewable energy projects have faced opposition due to their environmental and social impacts. For example, large-scale hydropower projects have led to displacement and environmental degradation in some areas. The lack of local capacity for the manufacture and maintenance of renewable energy technologies is a significant challenge. Nigeria relies heavily on imported technologies, which can be expensive and difficult to maintain. There is also a shortage of skilled labour to install and manage renewable energy systems. Sustainable energy development in Nigeria is essential for the country's economic growth, environmental protection, and social well-being. While there have been significant strides in policy formulation and legal framework development, numerous challenges still need to be addressed to fully realize Nigeria's sustainable energy potential. Continued efforts in infrastructure development, regulatory reform, public awareness, and investment promotion are crucial for overcoming these challenges.

Nigeria, with its vast natural resources and growing population, faces a significant energy crisis characterized by inadequate access to reliable and sustainable electricity. Despite being one of the largest oil and gas producers in the world, the country has struggled to provide consistent energy to its population. The national grid is characterized by frequent blackouts, leaving many regions, particularly rural areas, with limited or no access to electricity. This energy inadequacy has profound implications for economic development, industrialization, and the overall quality of life in Nigeria. The pressing need for sustainable energy development is underscored by the global shift towards renewable energy sources to combat climate change and reduce greenhouse gas emissions.

¹¹ Y Oke, *Nigerian Electricity Law and Practice* (2nd edn Princeton & Associates Publishing Co. 2021) 30-45.

¹² *Ibid.*

¹³ *Ibid.*

¹⁴ *Ibid.*



The country's outdated and insufficient energy infrastructure cannot meet the demands of a growing population and economy. This includes the lack of modern grid systems capable of integrating renewable energy sources like solar, wind, and hydropower. While Nigeria has developed several policies and legal frameworks to promote renewable energy, inconsistent policy implementation, bureaucratic delays, and regulatory bottlenecks have hindered progress. The absence of a clear and consistent regulatory environment deters investment and slows the pace of sustainable energy development. The high capital costs associated with renewable energy projects, coupled with limited access to finance, make it difficult to scale up sustainable energy solutions. The lack of financial incentives and risk mitigation measures for investors further exacerbates the problem. Insecurity in various parts of the country, especially in the Niger Delta and the northeastern regions, threatens energy infrastructure and deters both local and foreign investments in renewable energy projects.

There is a significant lack of awareness and acceptance of renewable energy technologies among the Nigerian populace. Many are unaware of the long-term benefits of renewable energy, which results in resistance to adopting these technologies, particularly in rural communities. Some renewable energy projects, particularly large-scale hydropower, have faced opposition due to their environmental and social impacts, such as displacement of communities and ecological disruption. Nigeria lacks the local capacity for the development, manufacturing, and maintenance of renewable energy technologies. This deficit is compounded by a shortage of skilled labour to operate and manage these technologies.

2.0 An Appraisal of Sustainability Energy Development and Challenges in Nigeria

The regulatory framework for the promotion and integration of renewable energy sources in Nigeria is multifaceted, involving various laws, policies, and institutional mechanisms. This framework is designed to encourage investment in renewable energy, ensure the integration of these energy sources into the national grid, and align Nigeria's energy sector with global sustainability goals.¹⁵ As Nigeria seeks to diversify its energy mix and reduce dependence on fossil fuels, the regulatory environment plays a critical role in shaping the landscape for renewable energy development.¹⁶

The foundation of Nigeria's renewable energy regulatory framework lies in the National Energy Policy (NEP) of 2003 and the National Renewable Energy and Energy Efficiency Policy, 2015.¹⁷ The NEP provides a broad outline for the development of the energy sector, emphasizing the need to diversify energy sources and promote the use of renewable energy.¹⁸ The NREEEP further elaborates on these goals, setting specific targets for renewable energy contributions to Nigeria's energy mix and outlining measures to enhance energy efficiency. These policies are essential for setting the strategic direction for renewable energy in Nigeria, but their impact has been somewhat limited by challenges in implementation and enforcement.¹⁹

¹⁵ O Yahaya and O E Nwabuogo, 'Renewable Energy Deployment as Climate Change Mitigation in Nigeria' [2016] (16) (4) *Global Journal of Human-Social Science*, 10-21.

¹⁶ *Ibid.*

¹⁷ *Ibid.*

¹⁸ *Ibid.*

¹⁹ M A C Chendo, 'Non-Conventional Energy Source: Development, Diffusion Impact on Human Development Index in Nigeria' [2001] (9) (1&2) *Journal of Renewable Energy*, 91-102.



The Electric Power Sector Reform Act (EPSRA) of 2005 is another critical piece of legislation in Nigeria's renewable energy landscape. EPSRA established the Nigerian Electricity Regulatory Commission (NERC), which plays a pivotal role in regulating the electricity sector, including the promotion of renewable energy. Under the EPSRA, NERC has the authority to issue licenses for renewable energy projects, set tariffs, and create regulations that support the integration of renewable energy into the national grid. The Act also facilitated the unbundling of the Power Holding Company of Nigeria (PHCN), opening the door for private sector participation in the renewable energy sector.²⁰

One of the key regulatory instruments introduced to promote renewable energy in Nigeria is the Feed-in Tariff (FiT) system, which was introduced by NERC. The FiT provides a guaranteed price for electricity generated from renewable sources, making it more attractive for investors. Alongside the FiT, the Renewable Energy Master Plan (REMP) was developed to provide a roadmap for achieving a significant share of renewables in Nigeria's energy mix by 2030.²¹ These initiatives are crucial for encouraging investment and ensuring that renewable energy projects are financially viable, yet the actual deployment of these policies has faced hurdles due to bureaucratic delays and insufficient financial backing. Despite the comprehensive regulatory framework, the implementation of policies promoting renewable energy in Nigeria has encountered several challenges. One of the main issues is the inconsistency and overlap in regulations, which can create confusion and deter investment. Additionally, the regulatory environment has often been characterized by delays in the issuance of licenses and permits, as well as in the implementation of key policies like the FiT. Furthermore, the financial sector in Nigeria has been slow to provide the necessary capital for large-scale renewable energy projects, partly due to perceived risks and a lack of understanding of the sector.

Institutional barriers also pose significant challenges to the integration of renewable energy in Nigeria. Coordination among the various agencies involved in energy regulation, such as the Ministry of Power, the Rural Electrification Agency (REA), and NERC, has been weak, leading to inefficiencies.²² Infrastructural constraints, particularly the inadequacies of the national grid, further complicate the integration of renewable energy sources. The grid is often unable to accommodate the intermittent nature of renewable energy, leading to concerns about the reliability and stability of the energy supply.²³ Nigeria's regulatory framework for renewable energy is also shaped by its international commitments, such as the Paris Agreement, which obliges the country to reduce its carbon emissions and increase the share of renewable energy in its energy mix.²⁴ The African Renewable Energy Initiative and other regional frameworks have also influenced Nigeria's policies. While these international commitments provide a strong impetus for regulatory reforms, aligning domestic policies with global standards remains a challenge, particularly in the face of economic and political pressures that favour fossil fuel industries.

²⁰ *Ibid.*

²¹ *Ibid.*

²² S C Dike, *Energy Security the case of Nigeria and Lessons from Brazil, Norway, and the UK* (Pearl Publishers 2015) 2-30.

²³ *Ibid.*

²⁴ *Ibid.*

3.0 Legal Obstacles Hindering Implementation of Sustainable Energy Projects in Nigeria

One of the primary legal obstacles hindering the implementation of sustainable energy projects in Nigeria is the regulatory inconsistency and overlapping jurisdictions among government agencies. The Nigerian energy sector is governed by multiple regulations and policies, often resulting in conflicting mandates between agencies like the Nigerian Electricity Regulatory Commission (NERC), the Ministry of Power, the Rural Electrification Agency (REA), and state governments.²⁵ For example, while NERC is responsible for issuing licenses for power generation, state governments also have regulatory authority over land use and environmental matters, leading to conflicts and delays in project approvals. This regulatory overlap creates confusion for investors and developers, making it difficult to navigate the legal requirements for renewable energy projects.²⁶

3.1 Lengthy and Complex Licensing Processes

The licensing process for renewable energy projects in Nigeria is another significant legal hurdle. Obtaining the necessary licenses and permits can be a lengthy and complex process, often taking years to complete.²⁷ For instance, developers need to secure multiple permits, including environmental impact assessments, land use approvals, and generation licenses from different agencies.²⁸ The bureaucratic delays and the lack of streamlined procedures discourage potential investors and slow down the deployment of renewable energy projects. An example is the delay in the development of some solar power projects under the Nigeria Solar Capital Partners, where protracted licensing processes have stalled progress.

3.2 Land Acquisition and Legal Disputes

Land acquisition poses a considerable legal obstacle for renewable energy projects, particularly in Nigeria, where land ownership issues are complex and often contentious.²⁹ The Land Use Act of 1978 vests all land in a state's territory in the hands of the State Governor, complicating the process of acquiring land for large-scale renewable energy projects. Disputes over land ownership, compensation, and rights can lead to prolonged legal battles, as seen in cases where local communities have contested the acquisition of land for wind and solar farms. These disputes not only delay project timelines but also increase the costs associated with legal proceedings and negotiations.³⁰

3.3 Inadequate Legal Framework for Off-Grid and Decentralized Energy

Nigeria's current legal framework is primarily designed for centralized grid-based energy systems and does not adequately address the growing need for off-grid and decentralized renewable energy solutions.³¹ This gap in the legal framework makes it challenging to implement small-scale renewable energy projects, such as solar mini-grids and home solar systems, which are crucial for expanding

²⁵ N V Emodi and N E Ebele, 'Policies Enhancing Renewable Energy Development and Implications for Nigeria Sustainable Energy' [2016] (4) *Science and Education*, 17-16.

²⁶ *Ibid.*

²⁷ *Ibid.*

²⁸ *Ibid.*

²⁹ LUA, 1978, s 21-28.

³⁰ N V Emodi and N E Ebele, 'Policies Enhancing Renewable Energy Development and Implications for Nigeria Sustainable Energy' [2016] (4) *Science and Education*, 17-16.

³¹ *Ibid.*

energy access in rural and underserved areas. The absence of clear regulations and incentives for decentralized energy solutions has limited the scale and impact of renewable energy deployment in these areas. For example, while the REA has made efforts to promote mini grids, the lack of specific legal protections and incentives for private sector participants remains a significant barrier.³²

3.4 Limited Legal Support for Financing and Investment

The legal environment in Nigeria also poses challenges for securing financing and investment for renewable energy projects. Although the government has introduced policies like the Renewable Energy Master Plan and the National Renewable Energy and Energy Efficiency Policy (NREEEP), there is still a lack of robust legal frameworks that provide guarantees and incentives to attract private investment.³³ Issues such as the absence of long-term power purchase agreements (PPAs), lack of clear guidelines on tariffs, and uncertainties in currency exchange laws make it difficult for investors to commit to large-scale renewable energy projects. An example of this is the difficulty in securing financing for solar projects under the Nigeria Electrification Project, where uncertainties around tariffs and PPAs have deterred potential investors.³⁴ These legal obstacles highlight the need for comprehensive reforms to streamline regulatory processes, clarify land acquisition laws, create supportive legal frameworks for off-grid energy solutions, and enhance legal support for financing renewable energy projects in Nigeria. Addressing these challenges is crucial for accelerating the deployment of renewable energy and achieving Nigeria's sustainable energy goals.³⁵

4.0 Appraisal of Enforcement of Environmental Impact Assessments and Effect on the Development of Sustainable Energy Projects in Nigeria

Environmental Impact Assessments (EIAs) are crucial regulatory tools designed to evaluate the potential environmental effects of proposed projects before they are carried out. In Nigeria, the enforcement of EIAs is governed by the Environmental Impact Assessment Act of 1992³⁶, which mandates that any development project likely to have a significant environmental impact must undergo an EIA. The purpose of the EIA process is to ensure that decision-makers consider environmental consequences when approving projects and that measures are taken to mitigate negative impacts. For renewable energy projects, this means assessing how the development might affect local ecosystems, water resources, land use, and communities. In the context of renewable energy projects, EIAs play a vital role in ensuring that these projects, while beneficial for reducing carbon emissions and dependence on fossil fuels, do not inadvertently harm the environment or local communities. For instance, the development of large-scale solar farms requires significant land use, which could disrupt local ecosystems or displace communities. Similarly, wind farms may have implications for bird migration patterns or noise pollution.

Despite the clear importance of EIAs, the enforcement of these assessments in Nigeria faces several challenges. One significant issue is the inconsistency and inefficiency in the EIA process, which can

³² *Ibid.*

³³ N V Emodi and N E Ebele, 'Policies Enhancing Renewable Energy Development and Implications for Nigeria Sustainable Energy' [2016] (4) *Science and Education*, 17-16.

³⁴ Emodi and N E Ebele (n19).

³⁵ *Ibid.*

³⁶ Cap. E12 L.F.N. 2004.



result in delays and added costs for renewable energy developers. The EIA process is often criticized for being overly bureaucratic, with multiple layers of approval required from different government agencies. Additionally, there are concerns about the adequacy of the assessments themselves, as some EIAs may not be conducted thoroughly due to limited resources or technical expertise. This can lead to situations where environmental risks are not fully addressed, potentially harming local communities and ecosystems. The delays and uncertainties associated with the EIA process can have a substantial impact on the development of renewable energy projects in Nigeria. For instance, protracted EIA procedures can lead to increased project costs and timelines, making renewable energy projects less attractive to investors. Developers often face significant challenges in navigating the complex EIA requirements, which can result in stalled projects or the abandonment of planned initiatives. A notable example is the delay in some wind and solar projects, where lengthy EIA processes have deterred timely project execution, thereby slowing the growth of the renewable energy sector in Nigeria.

While the enforcement of EIAs has the potential to mitigate environmental risks, the effectiveness of this process in Nigeria is sometimes compromised by weak implementation and oversight. There are instances where EIA recommendations are not fully implemented or monitored, leading to environmental degradation or conflicts with local communities. For example, in some cases, renewable energy projects have proceeded with minimal adherence to EIA recommendations, resulting in negative environmental impacts that could have been avoided. This underscores the need for stronger enforcement mechanisms and continuous monitoring to ensure that EIA conditions are met throughout the lifecycle of renewable energy projects.³⁷

4.1 A Critique of Just Energy Transition and Institutional Roles

A Just Energy Transition refers to the shift from fossil fuel-based energy systems to renewable energy sources in a way that is equitable, inclusive, and sustainable. It aims to address the socio-economic and environmental impacts of this transition, particularly on vulnerable communities that may be disproportionately affected.³⁸ In Nigeria, institutions such as the Federal Ministry of Power, the Nigerian Electricity Regulatory Commission (NERC), the Rural Electrification Agency (REA), and various environmental and economic regulatory bodies play crucial roles in facilitating this transition. However, the effectiveness of these institutions in ensuring a just energy transition has been mixed, with significant challenges that need to be addressed.

4.2 Institutional Coordination and Fragmentation

One of the key criticisms of the role of institutions in Nigeria's just energy transition is the lack of effective coordination among them.³⁹ The energy sector in Nigeria is highly fragmented, with overlapping mandates and responsibilities across different agencies. For instance, while the Ministry of Power oversees the general policy direction, NERC regulates the electricity market, and the REA focuses on rural electrification. This fragmentation often leads to inefficiencies and delays in policy

³⁷ G M Ngala and Others, 'Review of Geothermal Energy Technology and its Potential for Power Generation in Borno Basin, Nigeria' [2015] (14) *Annals of Borno*, 91.

³⁸ *Ibid.*

³⁹ N K Grant and Others, 'Potassium- Argon Ages and Strontium Isotope Ratio Measurements from Volcanic Rocks in Northern Nigeria' [2016] (3)(5) *Contr. Mineral and Petrol*, 277.

implementation.⁴⁰ The lack of a unified approach hinders the development of coherent strategies that could address the socio-economic impacts of the energy transition, such as job losses in the fossil fuel sector and the need for re-skilling workers.

4.3 Inadequate Support for Vulnerable Communities

Institutions in Nigeria have also been criticized for not adequately addressing the needs of vulnerable communities in the energy transition process. A just energy transition should prioritize the inclusion of marginalized groups, such as rural communities, women, and low-income households, who are often most affected by energy poverty and the impacts of climate change.⁴¹ However, many of Nigeria's institutional efforts have focused more on urban and grid-connected areas, with rural and off-grid communities receiving less attention. The REA has made some progress in expanding access to renewable energy in rural areas, but the scale of these efforts is insufficient to meet the needs of the entire population. Moreover, there is a lack of targeted programs aimed at ensuring that these communities' benefit from the transition, such as through job creation or community-owned renewable energy projects.

4.4 Regulatory and Policy Gaps

Another significant challenge is the existence of regulatory and policy gaps that undermine the effectiveness of institutions in promoting a just energy transition.⁴² For example, while there are policies in place to encourage renewable energy development, such as the National Renewable Energy and Energy Efficiency Policy (NREEEP), these policies often lack the necessary enforcement mechanisms or are not adequately funded. Additionally, the absence of specific legislation or frameworks that address the socio-economic aspects of the energy transition, such as social protection for workers in the fossil fuel industry, is a major shortcoming.⁴³ This gap means that the transition could exacerbate existing inequalities and lead to social unrest if not properly managed.

4.5 Limited Institutional Capacity and Resources

The capacity and resources of institutions involved in Nigeria's energy transition are often limited, which hampers their ability to effectively carry out their mandates.⁴⁴ Many of these institutions suffer from inadequate funding, insufficient technical expertise, and bureaucratic inefficiencies.⁴⁵ For instance, the implementation of renewable energy projects by the REA and the monitoring and enforcement of regulations by NERC are often slowed down by these capacity constraints. Moreover, the lack of transparency and accountability within some of these institutions further undermines their role in ensuring a fair and inclusive transition. Without strengthening the institutional capacity and ensuring proper resource allocation, the goal of a just energy transition in Nigeria may remain elusive.

⁴⁰ *Ibid.*

⁴¹ Grant and Others, (n24).

⁴² E E Abraham and E E Nkitnam, 'Review of Geothermal Energy Research in Nigeria: The Geo-science Front' [2017] (3) (15) *Int. J Earth Sci Geophys*, 7.

⁴³ Abraham and E E Nkitnam (n26).

⁴⁴ *Ibid.*

⁴⁵ *Ibid.*

4.6 Harmonization of National and International Energy Policies

Harmonizing national energy policies with international commitments is crucial for ensuring a just energy transition in Nigeria.⁴⁶ This alignment is necessary to achieve sustainable development goals, meet global climate change targets, and foster socio-economic equity within the country. Nigeria, as a signatory to various international agreements, such as the Paris Agreement and the United Nations Sustainable Development Goals (SDGs), is obligated to integrate these commitments into its national energy policies. This integration is essential for ensuring that the country's energy transition is not only environmentally sustainable but also socially equitable.⁴⁷

The Paris Agreement, which Nigeria ratified in 2017, commits countries to limit global temperature rise to below 2°C above pre-industrial levels, with efforts to limit the increase to 1.5°C. To meet these targets, Nigeria needs to significantly reduce its greenhouse gas emissions, which requires a shift from fossil fuels to renewable energy sources. The Nationally Determined Contributions (NDCs) under the Paris Agreement outline Nigeria's commitments, including increasing the share of renewable energy in the energy mix and enhancing energy efficiency. However, for these international commitments to translate into a just energy transition, national policies must prioritize the inclusion of vulnerable communities, ensuring they are not adversely affected by the shift away from fossil fuels. This requires not only setting ambitious targets but also implementing strategies that address the socio-economic impacts of the transition, such as job losses in the oil and gas sector.

The United Nations Sustainable Development Goals, particularly SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action), are central to achieving a just energy transition. Nigeria's national energy policies, including the National Renewable Energy and Energy Efficiency Policy (NREEEP) and the Nigeria Energy Transition Plan (ETP), are designed to align with these goals by promoting access to affordable, reliable, sustainable, and modern energy for all. However, challenges remain in ensuring that these policies are effectively implemented to reach the most marginalized populations, especially in rural and off-grid areas. The integration of SDG principles into national policies is crucial for addressing energy poverty, reducing emissions, and promoting sustainable economic growth in a way that leaves no one behind.

Despite the importance of harmonizing national energy policies with international commitments, Nigeria faces several challenges in this regard. One major challenge is the existing dependency on oil and gas revenues, which complicates the transition to renewable energy. The oil sector is a significant source of employment and government revenue, and a rapid shift away from it could have severe economic repercussions. Additionally, there are discrepancies between Nigeria's national policies and its international commitments, often due to inadequate policy coherence and coordination among government agencies. For example, while Nigeria has committed to reducing emissions under the Paris Agreement, domestic policies have sometimes favoured the continued exploration and development of fossil fuels, reflecting a conflict between short-term economic interests and long-term sustainability goals.

⁴⁶ *Ibid*

⁴⁷ *Ibid.*

Despite these challenges, there have been successful efforts to harmonize national energy policies with international commitments. For instance, the Nigerian government's collaboration with the World Bank and the African Development Bank to develop the Nigeria Electrification Project (NEP) is a notable example. The NEP aims to increase access to electricity, particularly in rural areas, through the deployment of solar mini-grids and solar home systems. This initiative aligns with both Nigeria's national energy policies and its commitments under the Paris Agreement and SDG 7 by promoting renewable energy and reducing energy poverty. Another example is the Nigeria Energy Transition Plan (ETP), which outlines a roadmap for achieving net-zero emissions by 2060 while ensuring that the transition is just and inclusive. The ETP incorporates international best practices and aligns with global climate goals, demonstrating Nigeria's commitment to harmonizing its national policies with international obligations.⁴⁸

5.0 Lessons from the United Kingdom

5.1 Comprehensive Legal Framework for Climate Action

The UK has established a robust legal framework for climate action, starting with the Climate Change Act of 2008. This Act legally binds the UK government to reduce greenhouse gas emissions and sets out carbon budgets to ensure these targets are met. Nigeria can adopt a similar comprehensive legal framework that mandates specific emissions reductions and sets enforceable targets.⁴⁹ Such a framework could help Nigeria systematically reduce its carbon footprint and ensure that energy policies align with broader climate goals. This would also help Nigeria meet its international commitments under agreements like the Paris Agreement.

5.2 Incentives for Sustainable Energy Development

The UK has effectively used legal mechanisms such as the Renewable Energy Guarantees of Origin and feed-in tariffs to promote renewable energy. These incentives have helped increase the share of renewables in the UK's energy mix.⁵⁰ Nigeria could introduce similar incentives to encourage investment in renewable energy. Legal provisions for feed-in tariffs, tax breaks, or subsidies for renewable energy projects could stimulate growth in this sector, particularly in solar, wind, and biomass energy.⁵¹ This approach would help reduce Nigeria's reliance on fossil fuels and promote sustainable energy development.

5.3 Legal Support for Energy Efficiency

The UK's Energy Act 2013 and other related legislation have emphasized energy efficiency as a key pillar of sustainable energy development.⁵² The UK government has introduced stringent energy efficiency standards for buildings, appliances, and industries. Nigeria can draw from this by enacting stronger laws focused on energy efficiency. For example, setting minimum energy performance standards for appliances and buildings could significantly reduce energy consumption. Legal

⁴⁸ O I Okoro, E Chikuni and P Govender, 'Prospects of Wind Energy in Nigeria' (2007) <<https://www.researchgate.net/publication/228827644>> accessed 23 July 2024.

⁴⁹ Abraham and E E Nkitnam (n26)..

⁵⁰ *Ibid.*

⁵¹ O I Okoro, E Chikuni and P Govender, 'Prospects of Wind Energy in Nigeria' (2007) <<https://www.researchgate.net/publication/228827644>> accessed 23 July 2024.

⁵² *Ibid.*

requirements for energy audits and the implementation of energy-saving technologies in industries could also drive improvements in energy efficiency across the country.

5.4 Public Participation and Transparency in Sustainable Energy Policy

The UK has integrated public participation and transparency into its energy policy development, as seen in the public consultations and impact assessments that precede major policy decisions. The Aarhus Convention (which the UK is a party to) also reinforces these principles by ensuring public access to information and participation in environmental decision-making. Nigeria can enhance public participation in energy policy by legally mandating public consultations and transparency in the decision-making process. This could help address public concerns, improve policy outcomes, and ensure that energy projects are more socially inclusive. Legal frameworks could also be introduced to guarantee access to information and ensure that local communities are adequately involved in energy projects that affect them.

5.5 Legal Framework for Grid Modernization and Decentralization

The UK has embraced legal and regulatory reforms to modernize its electricity grid, making it more adaptable to renewable energy sources and decentralized generation.⁵³ The Smart Metering Programme and the Electricity Market Reform are examples of such efforts. Nigeria can benefit from legal reforms that modernize its electricity grid and support the integration of renewable energy sources. Legal provisions that promote grid expansion, the deployment of smart meters, and decentralized energy solutions like mini grids could significantly improve energy access and reliability in Nigeria.

6.0 Conclusion

The appraisal of sustainable energy development and challenges in Nigeria highlights a complex interplay of infrastructural deficiencies, regulatory hurdles, financial constraints, security issues, and public awareness gaps. Despite Nigeria's vast renewable energy potential, the effective transition to a sustainable energy system is impeded by these multifaceted challenges. Addressing these issues requires a comprehensive approach that integrates policy reforms, infrastructure investments, and stakeholder engagement. By tackling these barriers head-on, Nigeria can leverage its renewable energy resources to achieve long-term energy security, economic growth, and environmental sustainability.

7.0 Recommendations

7.1 Strengthen Legal and Regulatory Frameworks

Developing and enforcing clear, consistent policies and regulations for sustainable energy can reduce uncertainty and attract investment. This includes updating existing laws and creating new incentives for renewable energy projects. Nigeria should enhance its National Renewable Energy and Energy Efficiency Policy and ensure its alignment with international commitments like the Paris Agreement. Clear regulations and incentives, such as tax breaks and subsidies, could encourage private investment in renewable energy and facilitate project implementation.

⁵³ M T Jackson, 'The UK's Renewable Energy Policies: Legal Challenges in Transitioning' [2020] (38) *Journal of Environmental Law* 45-60.



7.2 Invest in Infrastructure Modernization

Upgrading energy infrastructure, including the grid and storage systems, is essential for accommodating renewable energy sources and improving energy distribution efficiency. The government should prioritize investments in modernizing the national grid to handle intermittent renewable energy sources like solar and wind. Additionally, developing decentralized energy solutions, such as mini grids, can improve energy access in rural areas and reduce transmission losses.

7.3 Enhance Public Awareness and Education

Increasing public knowledge about the benefits of renewable energy and energy conservation practices can drive adoption and support for sustainable energy policies. Implement nationwide educational campaigns and community outreach programs to inform the public about renewable energy technologies, their benefits, and practical energy-saving measures. This can foster greater acceptance and demand for sustainable energy solutions.

7.4 Develop Financial Mechanisms and Incentives

Addressing financial constraints through innovative funding mechanisms and incentives can mitigate investment risks and support the growth of sustainable energy projects. Establish green bonds, low-interest loans, and risk-sharing mechanisms to attract investment in renewable energy. Additionally, offering financial incentives such as feed-in tariffs and tax credits can make renewable energy projects more financially viable and appealing to investors.

7.5 Improve Security and Safety Measures

Enhancing security measures for energy infrastructure can protect investments and ensure reliable energy supply by mitigating the impact of vandalism and attacks. Strengthen security protocols for critical energy infrastructure, including surveillance systems and rapid response teams. Collaborate with local communities to address underlying causes of insecurity and build resilience against disruptions, ensuring stable and secure energy operations.